COMMISSION ON WATER RESOURCE MANAGEMENT

| FROM: | ROY | | DATE: | DEC 10 | 2008 | SUSPENSE DATE: | ~ ` |
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| Τ̈́O: | | INIT. | TO: | | INIT: | FOR: | PLEASE: |
| CI C | HENG, C. HING, F. HONG, R. ANBARA, S. NGLAND, D. UJII, N. ARDY, R. OAGBIN, S. E, C. MATA, R. AWAHARA, K. | | MILLS OHYE OHYE OSHIF SAKO SWAN TORR UYEN YODA | i, L. i, M. RO, K. D DA, E. NSON, S. RES, R. O, D. | 3m/ | Approval Signature Information | See Me Review & Comment Take Action Type Draft Type Final File Xerox copies |
| | muorva, u. | | VIDEC | ? | | Kapaa High 0419- | 05 |

EXHIBIT "I-97"





To <Charley.F.Ice CC bcc

Subject RE: Kapaa Highlands progress

History: This message has been replied to.

Most likely, First we need final planning commission approval and a development partner. We are doing well on getting both...

Greg Allen

From: Charley.F.Ice [mailto:Charley.F.Ice

Sent: Tuesday, September 06, 2011 10:28 AM

To: G. Allen

Subject: RE: Kapaa Highlands progress

Thanks for your prompt reply! We'll expect to see something from Barry Simmons on the well modifications?

"G. Allen" ⊲

To < Charley.F.ice

09/06/2011 08:54 AM

SubjectRE: Kapaa Highlands progress

Yes, The water board agreed to work with us on the water last month. Now we are able to move forward with finalizing the project and then construction.

Greg Allen

From: Charley.F.

Sent: Tuesday, September 06, 2011 8:40 AM

To: gallen

Subject: Kapaa Highlands progress

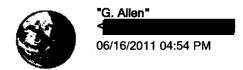
Good morning! Hoping to hear of progress on your agreements with Kauai County, plans to redrill and complete your new wells 0419-05 et al.

Charley Ice Hydrologist

Hawaii Water Commission

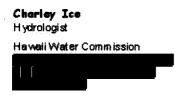
| - W | • | COMMISSION ON WATER RESOURCE MANAGEMENT 2 | 4Nov10 |
|-----|-------------------------------|------------------------------------------------------------------------------------------------------------------|----------|
| | FROM: Charley | DATE: 16 JUNE 11 | |
| | TO: IMATA, R. | INIT. TO: INIT. FOR: PLEASE: TAM, W Approval Review & Comment HARDY, R Signature Type Draft | |
| | UYENO, D. CHONG, R. | OHYE, L.N Information Type Final File | |
| | FUJII, N. KIMURA, J. | Copies: Take Action: | |
| | YOSHINAGA, M. KUNIMURA, I. | | he would |
| | . | DANBARRA, S. When he gets his deal w/KDOW, reapply to upsize his well, re-drill finish (seed off upper acquifer) | , mai |
| (R | 2: Sealing 0419.0 | 852 821 9636 Sandy Commendation. Montes 4m 4? | لم |
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To <Charley.F.Ice

Subject RE: Kapaa Highlands Well (0419-05)



Charley,

Below is the latest DOW proposal. The DOW Manager, Dave Craddick, Kauai's Mayor and I are on the same page.

I believe we will have board approval in July.

That will allow us to get final subdivision approval for 12 lots that have had tentative approval since 2000.

This will be at the county level and allow us to develop the first phase of the project which includes the water infrastructure.

The second phase involves a zoning change which is in process now. It will not affect the well. This has been a long process. I appreciate the patience the commission exercised on our behalf.

This project will provide the County with affordable housing, ownership of the Kapaa bypass highway,

another traffic reducing bypass through the project, a new county pool and a water well source to fill the new

Stables tank that is currently at 1/3 capacity.

The plan is to give the County the well and transmission infrastructure when it is completed.

Greg Allen

To: Dave Craddick

Kauai, Department of Water

To: Roy Oyama

Chairman of the Water board May 11, 2011

May 11, 2011 further clarification to the Modification and addendum of the 11-29-10 Proposal regarding water for the DOW and Kapaa Highlands.

The land was originally owned by Amfac. In 1999 it was sold to a Mr. Salagi who initiated a development project called "Kauai Highlands" and obtained DOW approval for 45 water meters. In 2001 the project was sold to its second developer, Kapaa 160. They called it "Kulana Kai". The water approval was rescinded. Kapaa 160 defaulted on their mortgage in 2003.

The 3rd (current) developers are members of Allen Family LLC. They are the second position mortgage holders of the property. They formed The Three Stooges LLC, and have been calling the project "Kapaa Highlands" since taking it over in September of 2003.

Kapaa Highlands has had a tentative AG CPR subdivision approval for 12 AG lots, totaling 52 CPR units, since September of 2003.

The County Planning, Housing, and Administration Departments informed us that 97 acres of the Kapaa Highlands project site is identified in the general plan for development, and that affordable housing is needed on Kauai.

The County has encouraged Kapaa Highlands to develop a residential community.

The Kapaa Highlands project is now divided into 2 phases. The 1st phase as proposed is 5 Agricultural subdivision lots. This 1st phase is a 66 acre part of the overall project. The 66 acres are not identified in the County General Plan for urban development. They will remain an agricultural subdivision. Most of this portion of the project is already used for herding cattle sheep and goats. We also have recently helped Kapaa Solar to build Hawaii's largest solar farm on this part of the project.

The 2nd Phase is planned for 7 lots after we get an agreement in principal with the DOW for water and final planning approvals. Kapaa Highlands is currently seeking a zoning amendment on this 7 lot, 97 acre part of the project to create an urban addition to Kapaa Town of up to 800 residential units.

This is in line with the County General plan and the Kapaa Development plan.

Kapaa Highlands needs DOW approval, since we do not desire nor intend to do a private water system in the middle of the current DOW system, to get a final subdivision approval and to make possible the rezoning and development goals of the County General plan.

Kapaa Highlands has drilled and proven a Test Well is capable of producing a minimum of 550 Gallons per minute of good water. (Refer to Kapaa highlands water master plan for details and engineering reports). We understand the well in its current form is not straight enough to meet DOW requirements and we propose to do another replacement well or wells to provide the 550 GPM. We believe the planning for peak and some portion out of service or 242 GPM on an average day basis exceeds our requirements for water.

The DOW has two water tanks, the Ornellas tank at 313', and the Stables tank at 214' elevation. It is our understanding the DOW needs source water for these two tanks. We also understand the

Ornellas tank upsizing has not yet gone to bid and is not yet funded.

Kapaa Highlands has excess source water however needs water storage for its project.

The Third revision of our Water Master Plan was turned in to the DOW June of 2010.

The Kapaa Highland proposal is that the DOW commit to providing Kapaa Highlands with water storage from its existing and developing storage infrastructure.

Kapaa Highlands will develop and provide source water at the same ratio of source cost to storage cost to the DOW in excess of its own needs to supplement the DOW 313' and 214' water service zones.

We think it is reasonable that some of the water from the 214' elevation "Stables" water tank be used for the part of the Kapaa Highlands project that is below the 115' TOPO line (see the attached map). We also understand the static water pressure at this elevation is a minimal 40 pounds per square inch and we are willing to accept an elevation agreement and install pneumatic tanks if Kapaa Highlands or its successors in interest decide to build two story units. The attached map identifies which parts of the project require water from the 214' elevation tank, and which parts require water from the 313' elevation zone tank.

If The DOW approves our plans, we will successfully build out a production well (or wells if necessary) built to DOW and CWRM standards, at the existing test well site.

We will build a water transmission line built to DOW standards to connect with the DOW system at Olohena road.

Kapaa Highlands will dedicate the well and necessary easements to the DOW.

Kapaa Highlands will develop the well and complete the transmission line during the 1st phase of the project. The Well will deliver 550 GPM or more of DOH/EPA quality water to the DOW.

The DOW will provide water to the 1st phase of Kapaa Highlands upon our completion of the production well and transmission line infrastructure.

Kapaa Highlands expects DOW will provide water to the 2nd phase of the Kapaa Highlands project only for buildings at or below the 115' TOPO line, upon completion of the Kapaa Highlands well and transmission line infrastructure.

The DOW will provide water to all of the 2nd phase of the Kapaa Highlands project only after its planned addition to the 313' elevation Ornellas water tank is completed and in service. And we are willing to accept covenants that run with the land

Should Kapaa Highlands fail to deliver water and infrastructure to the DOW as stated above then this agreement and any sales based on this agreement will be null and void.

The DOW would then be under no obligation or liability to provide storage to Kapaa Highlands. I don't see a downside for the DOW you will get the water you need.

Kapaa Highlands will pay FRC's and the residents will buy water from the DOW.

Greg Allen



From: Charley.F.Ice@h

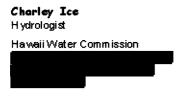
Sent: Thursday, June 16, 2011 3:43 PM

To: G. Allen

Cc:

Subject: RE: Kapaa Highlands Well (0419-05)

I've been asked to request a brief letter for the file, describing your expectations with negotiations and your plans for the well.



"G. Allen" <

06/14/2011 12:54 PM

To<Charley.F.Ice

Sorry about not responding. My only excuse is the contractor left the island.

As to caving I do not know of any history or evidence of caving. What the well log shows is that the contractor tries to enlarge the hole without a centering bit and created a crooked hole.

The DOW has me on the agenda for the board to review and I believe approve our water plans in July. Thank you,

Greg Allen 808-645-4500 gallen@harbormall.net

From: Charley.F.Ice@

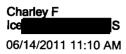
Sent: Tuesday, June 14, 2011 11:10 AM

To: G. Allen

Cc:

Subject: RE: Kapaa Highlands Well (0419-05)







Subject RE: Kapaa Highlands Well (0419-05)

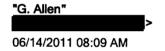
It's good that it's secured. Not good that we never received a reply to our Jaunary 5, 2009 letter requiring sealing. Good that there are plans to redrill and finish. Not good that the well may continue caving and wasting water.

Can we get a timeline of the negotiations with KDoW? What's the plan for finishing up this well?

Charley Ice Hydrologist Hawaii Water Commission

"G. Allen" <gailen@harbormall.net>





To <Charley.F.Ice

Subject RE: Kapaa Highlands Well (0419-05)

Aloha Charley,

High Plaines well drilling Marcus Frandson did weld a plate atop the well, it has not been used.

Kapaa Highlands has been working with the DOW on an agreement to drill a production well at the test well site.

We think we are within the last couple months of having that agreement done.

We thought this agreement and the re-drilling of the test bore into a production well would have been done well before now.

The well is at 26 feet elevation with no other well between it and the ocean.

Is it ok to leave it as it is until the end of 2011 in the hope that we will have finalized our DOW agreement and thereby been able to invest in drilling the permanent well?

Greg Allen 808-645-4500 gallen@harbormall.net

From: Charley.F.Ice@

Sent: Monday, June 13, 2011 10:04 AM

To:

Subject: Kapaa Highlands Well (0419-05)

We sent a letter January 5, 2009, requiring this well to be sealed, but have nothing back about it. What is the status of this project?

Charley Ice

Hydrologist

Hawaii Water Commission

March 17, 2011

NOTIFICATION OF PETTITION FILING

This is to advise you that a petition to amend the State Land Use District Boundaries with the following general information has been submitted to the State Land Use Commission.

Petitioner/Address: Kapa'a

Kapa'a Highlands Phase II

Three Stooges, LLC



Landowner: Tax Map Key:

Location:

Three Stooges, LLC (4) 4-3-03: Por 1 Kapaa, Kauai

State of Hawaii

Requested Reclassification;

Agricultural to Urban Approximately 97 acres

Acreage:

Residential

Proposed Use: Date Submitted:

March 17, 2011

You may review detailed information regarding the Petition at the State Land Use Commission Office "Commission") or the Planning Department of the County of Kauai.

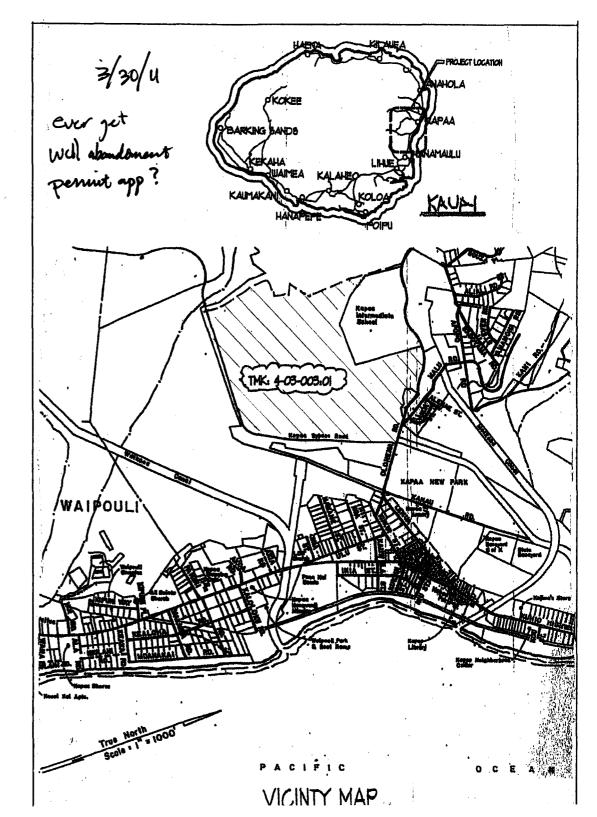
The Land Use Commission Office is located at

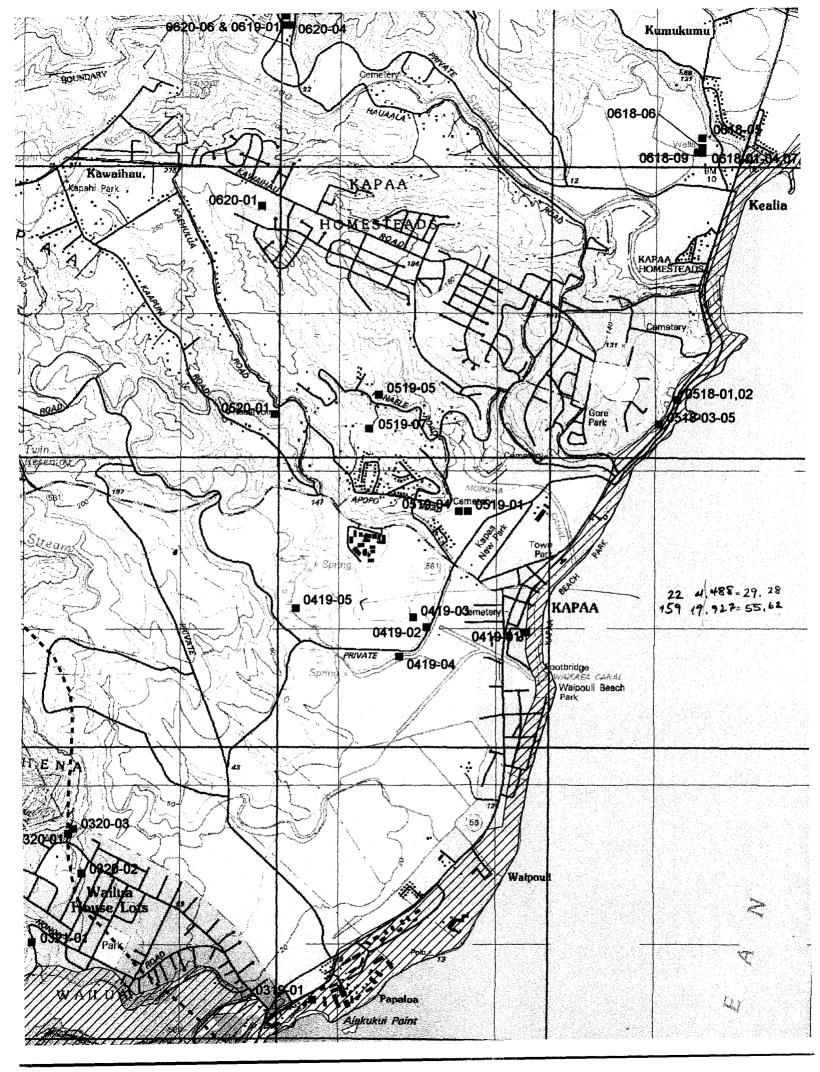
The Planning Department for

the County of Kauai is located at Co

A hearing on this Petition will be scheduled at a future date. If you are interested in participating in the hearing as a public witness, please write or call the Commission office at

If you intend to participate in the hearing as an intervenor, pursuant to Section 15-15-52, Hawai'I Administrative Rules, you should file a notice of Intent to Intervene with the Commission within 30 days of the date of this notice. Please contact the Commission office for further information.





March 17, 2011

NOTIFICATION OF PETTITION FILING

This is to advise you that a petition to amend the State Land Use District Boundaries with the following general information has been submitted to the State Land Use Commission.

Docket No.:

A11.791

Petitioner/Address:

Kapa'a Highlands Phase II

Three Stooges, LLC



Landowner: Tax Map Key:

Location:

Three Stooges, LLC

(4) 4-3-03: Por 1

Kapaa, Kauai

State of Hawaii

Requested Reclassification;

Acreage:

Agricultural to Urban

Approximately 97 acres

Proposed Use: Date Submitted:

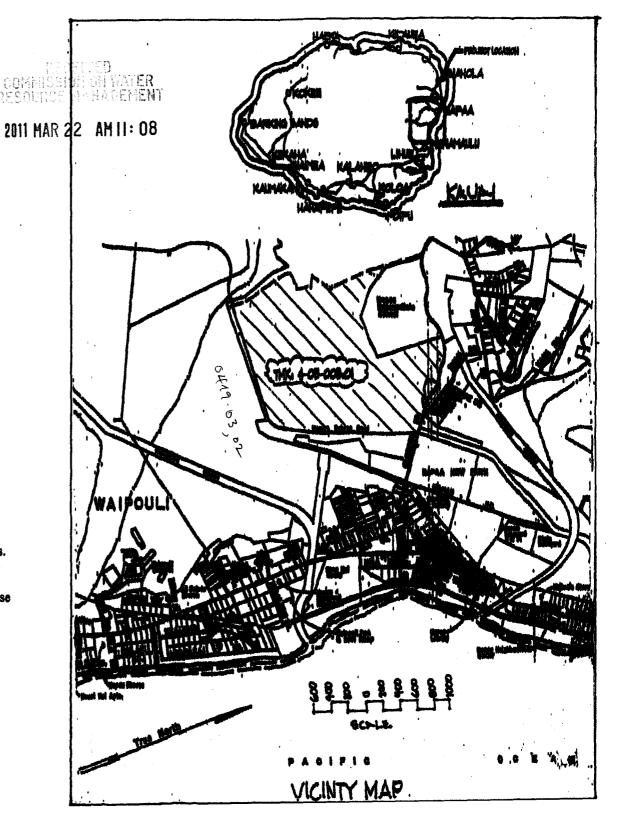
Residential

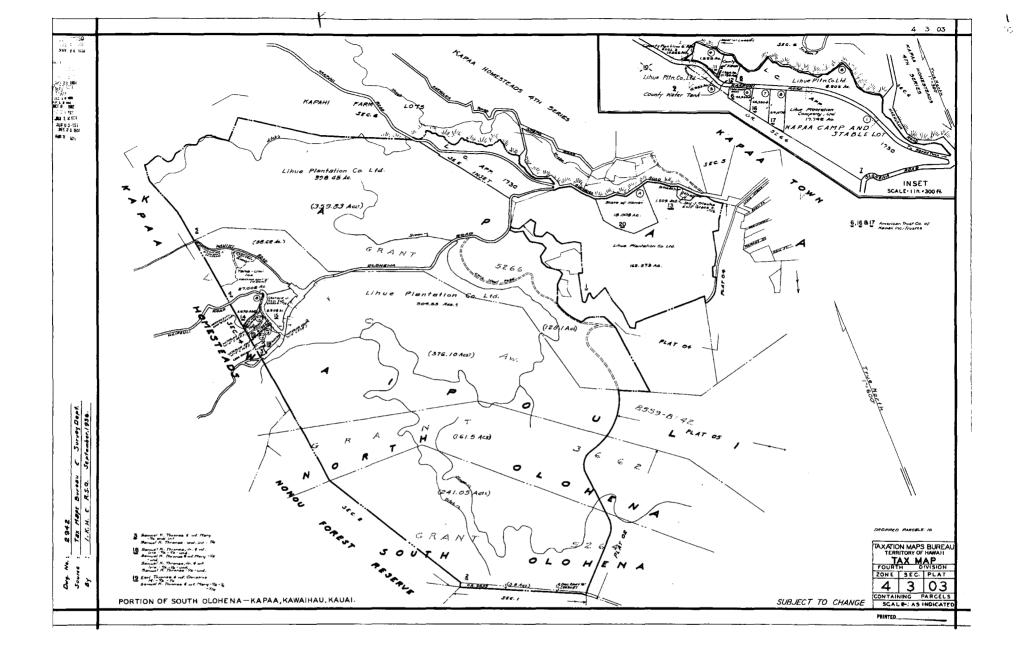
March 17, 2011

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Roy Hardy/DLNR/StateHiUS

05/24/2010 10:20 AM

To Charley F Ice/DLNR/S

CC

bcc

Subject Kapaa Highlands Well 0419-05

Charley,

Copying you the inquiry I handled. We need to follow-up with what's happening as the last correspondence with Oasis was that they were waiting for word from the developer when to seal the well.





DOVV Letter.pdf DOVV Comments.pdf

----- Forwarded by Roy Hardy/DLNR/StateHiUS on 05/24/2010 10:17 AM -----



Roy Hardy/DLNR

05/24/2010 10:14 AM

To "Frank F. Fasi Jr"

CC

Subject Re: FW:

Frank,

I don't know if it's cleared with Kauai DWS. From the documents you sent seems like KDWS still has concerns about how much water they are negotiating on providing the project from "the new well", which isn't identified. You might want to inquire with them.

From our perspective, they only need to construct wells properly and in accordance with our standards. They can use as much as the well can supply without detrimental effects to nearby streams and other wells. Our records show that the project came in for 4 wells, but later they decided that one well will supply enough water for their project and we. However, this one well has had problems in meeting our standards and we haven't officially accepted it. In fact, all the permits were cancelled to prevent further work and we requested that an abandonment permit be submitted for the one well. This was back in Jan 2009. We understand that the project has since changed drillers, and the new one is Oasis Water Systems, but there is currently no word back from Greg Allen on what he wants to do with the well yet as of August 09.

Thanks for this heads up as we'll need to follow-up with the driller on the status of this well. The driller (and Greg Allen) knows that there shouldn't be any upermitted work and the well needs more before it can be put into production for whatever they agree to with KDWS. Seems like KDWS is unaware of the problem or things have changed since 8/09 and we haven't been informed.

| "Frank F. Fasi Jr" | | | | requested into from Dalis |
|--------------------|---------------------|-------------|-----|---------------------------|
| | "Frank F. Fasi Jr" | I То | | 2d May 10 |
| | 05/24/2010 09:20 AM | СС | | |
| | | Subject | FW: | |

Roy,

Is this project cleared for water usage with DOW? See attachments from DOW. Let me know.

Warm Aloha and Mahalo,

Frank F Fasi, Jr.
Regional Sales Manager - State of Hawaii
GHI Mortgage, Inc.



ffasi@ghimortgage.com

www.ghimortgage.com

From: Greg Wongham [mailto:

Sent: Mon 5/24/2010 8:52 AM

To: Frank F. Fasi Jr Subject: Fw:

Frank,

Call me if you have any questions.

Aloha, Greg

From: GAllen <gallen

Subject:

To: "Greg Wongham"

Date: Tuesday, May 11, 2010, 11:36 AM

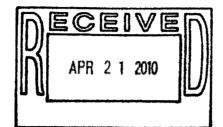
Greg this PV term sheet is confidential

We have met with DOW since the above and will have the final wording and modified engineering agreement.

Greg Allen



April 1, 2010



Mr. Tom Nance TNWRE

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| _ZTN | |
| GF | *************************************** |
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| | Action to the property contracts |
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| | |

Dear Mr. Nance:

Subject:

Revised Water Master Plan (WMP) for the Kapaa Highlands Project on

TMK: 4-3-03:001 Dated January 2010, Kapaa, Kauai

This is regarding your water master plan submittal which we received on February 1, 2010. The Department of Water's (DOW) comments to the WMP for Kapaa Highlands Project are shown on the attached spread sheet.

In addition, we will email you can comment directly onto it. It is requested that you follow the same format and numbering when you address/respond to DOW's concerns shown in the spreadsheet. Comment numbers along with comments left out of this spreadsheet signifies that the DOW's comments have been satisfied.

If you have any questions, please contact Mr. Edward Doi at

Sincerely,

David R. Craddick, P. E. Manager and Chief Engineer

ED:loo

T-11877 DOW comments for WMP for Kapaa Highlands dated Jan 2010 – 3-29-10

Attachment: DOW Comments Spreadsheet

| DOW Oct. 5, 2009 Letter Comment Number | DOW comments to WMP dated May 2009 | Tom Nance Reply to DOW comments to WMP dated May 2009 | DOW comments to WMP Jan. 2010 |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 | Page 1, "Introduction" - Is there any restriction on the number of houses allowed density of the agriculture and residential lots: Are there any provision for additional homes on these lots from those presently identified? | This question is answered separately in a January 28, 2010 memo from Max Graham to Gregg Fujikawa. | Introduction, pg1: 1.Please incorporate discussion for phase 2 that clarifies the option for further subdivision for lots 5 thru 12 with 34 farm dwelling units versus the option for urban development of the remnant 97.464 acre parcel into 86 single family units , 683 MF units, parks, church, commercial, etc. 2. Will ADU development be allowed in Phase II? If so please include in basis for design. 3. Please change reference to the Kapaa Homesteads 313' service zone from "312 - foot service zone" to "313' - service zone". |
| 4 | Page 1, "Basis of Design" - Include and discuss the water demand and land use of the remaining parcel (phase II in Table 1 and in the report text). | The discussion in the report has been expanded. However, because this area will be a typical urban development conforming to all DOW water system design criteria, it does not require the type of explanation provided for the proposed development in Phase 1. | Basis for Design -Ph1 Average Demand, 1. 2nd bullet, pg1: Please use 2,500 gpad average daily demand for agriculture demand. The 500 gpad average daily demand rate will not be allowed. Revise WMP analysis and findings accordingly. 2. Please account for any water demand for the remnant 97 acre parcel for phase 1. |
| 5 | Page 1, "Basis of Design" 4th bullet, last sentence - "Owner wishing to engage in other agricultural activities are required to develop their own, private water supply." Question/Concern - is this phrase acceptable to the Planning Department and who will enforce the development of a private water supply for other agricultural activities? Can use be limited to grazing upfront by the Planning Department? DOW recommend that 2,500 gpad minimum standard be applied to this development to accommodate other crops such as orchards and vegetables as stated in the Kapaa Highland Ag Master Plan dated June, 2007. This is a current requirement for the subdivision S-99-45. Who/how will ensure that lot owners will not use County water for Ag activities in lieu of finding own water source? | This question is answered separately in Max Graham's memo (1-28- 10) to Gregg Fujikawa. | Page 1, "Basis of Design - Phase 1 Average Demand, 4th bullet, pg 1: 1. The 2,500 gpad agriculture average daily demand is based on DOW Water System Standards. The subdivider/developer will be required to provide water system improvements based on the 2,500 gpad agriculture rate and the residential, commercial and other domestic consumption demand rates. |
| 8 | Page 4, "Well Supply" 1st paragraph - 44 and 355 gpm for Phase I and Phase II may need to be revised see #7 above. | Revisions to the required well supply have been made based on the adjustment of the single family use rate in comment 7 above. | see item #5, DOW comments to May 2009 WMP and DOW #4 comment to January 2010 WMP |
| 9 | Page 4, "Well Supply", 2nd to the last sentence - explain/provide information regarding adequate chlorine contact time as required by EPA's new groundwater rule. Explain the status and use of the test well that was drilled on the development site. | Appropriate additions have been made to the report text, including a chlorine contact time calculation which demonstrates the adequacy of the contact time provided by the transmission main. | Clarify in WMP that the main from the well to the DOW system will be a dedicated transmission line along a paved roadway (subject to DOW approval) and no service connections or other connections will be allowed on this line. (to support contact time calculation) |
| 11 | Page 4, Well Supply, 2nd paragraph. Note that the well design including diameter, depth, casing configuration, pump size and type to be submitted to the DOW separately for approval. | So noted. | Please state in the WMP that all water system infrastructure improvement facilities shall be designed and constructed and conveyed in accordance with DOW rules and regulations, standards and policies. |

. .

| 12 | Page 4, Well supply, 2nd paragraph. Please explain why the DOW should accept the well to pump the 313' system while the majority of the proposed demand is in the 214' system. It would be more energy efficient to pump directly to the 214' system. Please provide system improvements that allow well supply to deliver water to the 313 and/or 214 system based on system operation energy and system demand criteria. | 214-foot tank. If the well pump is designed to primarily deliver 450 GPM into the 214-foot service zone at peak efficiency, its delivery into | New well shall pump into the 214 zone (with allowance for chlorine contact time). Please consider separate booster pump station that is able to deliver sufficient supply to the 313 zone to allow maximum operating efficiency to bot service zones. |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13 | Page 5, Table 2, Average Day Demand for Phase II - Water allowances (demands) for common areas within the multi-family developments may be needed. | That may well be the case. However, at this stage in the planning for Phase 2, it is not possible to realistically quantify what the additional water requirements may be. We would prefer to leave the water use allocations as originally presented and make a future amendment to the master plan to include such used, if and when that may be appropriate. | Recommend the applicant notes and clarifies in the WMP that any amendme to the WMP may be required to be submitted to the DOW for review and approval and that additional water system facilities may be required at that time. |
| 14 | Page 7, "Reservoir Storage" 1st paragraph - Again MDD demands for Phase I may need to be revised See # 7 above. | Revisions with all single family residences in both phases based on ADD of 500 GPD/unit and MDD of 750 GPD/unit have been incorporated into the revised report. | see item #5, DOW comments to May 2009 WMP and DOW #4 comment to January 2010 WMP |
| 15 | Page 7 "Reservoir Storage" 1st paragraph - Developer will be required to construct necessary storage facilities for project's Phase I demand prior to DOW granting final subdivision approval (S-99-45). | The developer's proposal is to meet the project's storage obligation by the payment of facilities charges. He does not have access to a site to construct storage in either service zone. For such consideration by DOW, developer will e dedicating to DOW a well at the outset of Phase 1 with significant supply capacity in excess of the requirements of Kapaa Highlands for Phases 1 and 2. He will also make available land for Dow to develop a second well on his property if it so chooses. | see DOW item 4 comment |

| 16 | Page 7, "Reservoir Storage" 2nd paragraph - It should be noted that the 1.0 MG tank at the Ornellas Tank site is only in the planning stages. DOW cannot guarantee water service will be available from Ornellas tank or Stable tank, water service is on a first come, first-service basis. Developer has been required to provide additional storage facilities for S-99-45 and may be required to provide additional storage facilities when Phase It is rezoned by LUC and CO amendment process. | As indicated in the response to comment 15 above, the developer does not have access to land to build storage in either pressure zone. The developer's proposal to DOW is to allow him to pay facilities chares for storage in exchange for the additional well capacity he will dedicate to DOW. For this proposal to work, actual stage will need to be available. In the 312-foot zone, storage will hopefully be available from either the Kuiana or new Ornellas Tank. In the 214-foot zone, storage should be available upon completion of the new Stable Tank. | 1. see DOW item 4 comment 2. Pg. 8, 1st par & Pg. 16, Item 1 & 2, last sentence: Delete statements regarding payment of FRC for occupancy in Phase I and for storage in Kulana or new Ornellas and Stable tanks and replace with the following: "The Department will alllow Phase I which include 18 units (5 units in the 313' zone and 13 units in the 214' zone) to utilize water system storage capacity from existing DOW storage facilities. The Department may allow Phase II to utilize available water system storage capacityfrom existing County storage facilities to service the actual development of Phase II. Currently, the County storage facilities are not adequate to serve Phase II demand and approval for County water meter service, final subdivision and building permit approval will be dependent on the adequacy of the source, storage and transmission water system facilities existing when the request for water meter service, final subdivision or building permit approval is submitted. Phase II will not be allowed to receive advanced County water system storage capacity allocation. "3. State that prior to County water meter and/or building permit approval, the developer will complete the required water system facilities and complete other Department conditions for the project. |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 17 | Source may also be required. From table on page 4, development will require 511, 072 gpd mdd. Developer should provide their own storage. | The MDD in the table on page 4 has been revised to 504,698 GPD. Source would be provided with an onsite, DOW-dedicated well. As indicated above, the developer is proposing to meet his storage obligation with the payment facilities charges. | see DOW item 4 comment 2.See DOW item 16 comment see item #5, DOW comments to May 2009 WMP |
| 19 | Page 7, Basis of the Analysis, 2nd sentence. Item (4). 12-inch pipeline from Olohena/Kaapuni intersection to Kapaa Intermediate School. Please clarify if this pipeline proposed for this development or under another development. | The 12-inch pipeline was designed by Bow Engineering & Development, Inc. and has been installed as a part of the Kulana project. | Hydraulic Analysis for 313-Foot Service Zone, Basis of the Analysis, pg 9: 1. State that the new 12 - inch pipeline along Olohena Road from the Olohena/Kaapuni Road intersection to Kapaa Intermediate School is a required mainline extension for Kapaa Highlands, Phase I and Phase II. State that this mainline is not completed and will be completed by the developers of Kapaa Highland, Phase I and Phase II prior to final subdivision map or building permit approval. |
| 21 | Page 9, "Results of Phase II". Provide a comparison for node residual pressure (at select nodes) of existing conditions and the proposed development demands. The purpose is to verify that the proposed development water system improvements are sufficient to prevent any detrimental effect to the existing consumers in the Kapaa Water system. | These comparisons have been added to the report. | Please provide additional comparison analysis for Kapa'a Homesteads 530' and 248'PRV zones. How is the upper Kapaa homesteads area affected if water is pumped from well to 214' zone? |

| 22 | Provide "Summary" which identifies necessary water facilities for each phase (what is required or proposed and who is responsible i.e Kulana Tank - certification of completion needed, tank at stable site - DOW to construct, will use available capacity, source development, etc.). | A summary section has been added at the end of the report. | Summary of project's Infrastructure Requirements and Tentative Schedule: 1. Please add a table that clearly describe required water system facility improvements by source, storage and transmission/distribution elements for Phase I and Phase II. Include facility type, material, size, length, capacity, location, implementation dates etc. |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23 | Please address the implementation of water system improvements for this development along with the overall development schedule for this two-phased development. | Although this question is answered separately in Max Graham's memo to Gregg Fujikawa, a discussion of the development schedule is included in the summery which has been added at the end of the report. | see item #22, DOW comments to May 2009 WMP |
| 26 | How will the project affect he upstream flows above ornellas Tank? There was a low pressure concern for the area due to the Kulana/Kulana kai demands. The Kapaa Highlands project demands are far greater than the Kulana Kai project. | If the project's well pumps into the 312-foot zone, there would be no adverse effect above the Ornellas Tank since none of the water used in the 312-foot zone would be provided by sources in the service zone above the Ornellas Tank. If the well only pumps to the 214-foot zone, there would be some adverse effect as sources in the zone above the Ornellas Tank would be providing the water used in the 312-foot zone. This is why the original recommendation was to pump to the 312-foot zone. However, it is DOW's choice to make. | time). Please consider separate booster pump station that is able to deliver |
| 27 | Figure No. 3. Clarify which are existing pipelines and which pipelines are proposed. Show proposed new well and proposed 12-inch transmission pipeline for reference. Show Phase II pipeline in background for reference. | Figure 3 has been modified and additions have been made to the text. | In addition, include existing and new required storage facility and connecting mainlines for Phase 1 and Phase 2 in the figures. Pipes for Kulana Subdivision are not considered "existing pipeline" per the legend. Figure 3, pg 6, show proposed new well and proposed 12-inch transmission pipeline for reference. |
| 28 | Figure No. 4. Clarify the existing pipelines and which are the proposed pipelines. Show proposed new well and proposed 12-inch transmission pipeline for reference. Show Phase I pipeline in the background for reference. | Figure 4 has been modified and additions have been made to the text. | 1. see DOW item 27 comment |
| DOW additional comment 30 | | | Discussed in report how Appendix I Data input with average day demands were determined (i.e. were/how demands combined and used in model, describe system outflow [pg 27 appendix I] of 230 gpm at node 308 stable tank [where is water capacity coming from, is this for vivian heights?], what's happening at south end [input/output Lihue water system], etc. 2. The figures in table 3 for phase I do not seem to match the figures of table 1. Please recheck. |
| DOW additional comment 31 | | | Identify in the WMP that Backflow Preventer Assemblies will be required on all meters serving agriculturally zoned lots. |



Oasis Water Systems

08/10/2009 01:09 PM

To Charley.F.Ice

CC

bcc

Subject Re: another loose end

Hi Charley -

I spoke with Malia about this when the property was selling, several months ago.

But since that well was drilled long before we were in existence, we couldn't help much.

Do you want her phone number?

Also - Barry has a call into Greg Allen to see when he wants us to plug his well.

Betsy Lis

Oasis Water Systems, Inc.

--- On Tue, 7/28/09, Charley.F.

wrote:

From: Charley.F.Ice v < Charley.F

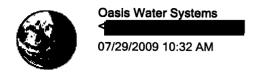
Subject: another loose end

To: oasiskauai@yahoo.com

Date: Tuesday, July 28, 2009, 4:21 PM

There was an open question about resolving an undocumented well in Moloaa, on a parcel owned by Irving and France Have you been in contact with realtor Malia Powers? Any decisions about proceeding with a well check? Any evidence well since 1982 or so?

(Also awaiting a decision on sealing/redrilling the Kapaa Highlands Well (0419-05))



To Charley.F.Ice

Subject Re: another loose end

Hi Charley -

"1120-52

Malia did contact us awhile ago regarding the Dumm well. I don't know if she contacted Barry again since th today, but I will ask him about this and the Kapaa Highlands well sealing in the morning.

Have a great day!

Betsy Lis

Oasis Water Systems, Inc.

4

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wrote:

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Subject: another loose end

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To Roy Hardy/DLNR/

Subject status on Kauai projects

Denise passed along 5 folders/cases for follow up, and here's my summary of where I think they are (I haven't initiated any action until getting the lay of it all)

1. 1123-03 (Friedman Well) - the notes are to resolve the water level/depth to water in the well prior to acceptance of the WCR1. The numbers on the well section diagram are "corrected" but still don't all add up right.

For starters, I took a hard look at the map for elevation, and noticed there's a Goldberg Well (1222-03 on the adjacent parcel) with a surveyed elevation. There's not that much slope between them, so I figure the correct wellhead elevation must be very close to the original estimate, not to either of two as-built estimates. The water level may be the product of two encounters with incoming water, one at 45 ft. below grade (similar to Goldberg's -- I spoke with Barry Simmons of Oasis, who gave details of that drilling), and one very near the bottom of the hole, 90 ft. lower (hence the prolonged HWCPIS discussion on isolating aquifers and reporting water encounters). The amount of standing water is the question, to me; the Goldberg Well had multiple encounters and evidently ample head in the borehole to supply small pumps like this (~40 gpm) With the well completed, we need to inform Lluellen about where the standards are going in the future, and our expectations for the very next well. I don't know if we can assess whether these are two aquifers or two fractures in the same one. Next: talk with Lluellen on these points.

- 2. 0523-02 (Kapaa Homestead 3 Monitor Well) the notes are to follow up on the CWRM approval to seal this "temporary" MW in five years (by 20 Feb 08): USGS was to do it. I've emailed Gordon asking for the Abandonment WCPIA ASAP.
- 3. 0419-05 (Kapaa Highlands Well #1, Greg Allen) the notes are to follow up with Marcus Frandsen to seal this well.

One of the last file entrees (20 Feb 09) is a letter from Allen saying Barry Simmons of Oasis would do it. That's a more positive prospect than following up with Frandsen, although we can still put MF on the hook for fines. For now, I've asked Oasis to get on the WCPIA, and will bug Betsy Lis when she returns from vacation in a couple weeks.

- 4. 1222-08 (Moorhead Well) the notes are that the well may have been drilled before permitted. I see no indication why that may be so -- just some testimony from a year earlier that she was farming, but she testified that the Kaloko Res was her sole source of water. However, I do see a question about the water level on this one, too, so will be calling Lluellen about these two wells. I'll pass this to Mitch, as he may catch something else before I call.
- 5. 1122-01 (Green Thumb Well, Benjamin Cassiday) the notes are that the owner's responsibility for meter and photo have not been met, and that three notices of potential violation have been sent, two returned unopened.

The folder does have a photo from Betsy Lis at Oasis, not marked nor dated but attached to a dated email referring to this well.

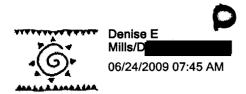
I would suggest preparing a violation action for CWRM, and identifying on the certified envelope that it's an opportunity to respond to a proposed fine. The letter should be copied to Kauai County, or at least the ultimate CWRM action should be.

Charlette Probation Company Charlette Charlette

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Hi Betsy,

Can you give me an update of plans for the Kapaa Highlands well, 0419-05? Is there a plan to try to retrofit it, or will it be permanently sealed (the latter would be our preference). I need to followup with Greg Allen on our last correspondence, sent on January 5, 2009.

While we received notice that Greg hired Oasis to address the issues we identifed, we have not had any further follow up. We need either an abandonment permit application and schedule, or a plan to properly construct a well in the hole (would require additional pump testing) and a schedule for that work. Any information you have would be appreciated as we continue to try to resolve this issue.

Thanks, Denise AloHA DENISE Mills

BARRY WITH OASIS WILL BE Halping ma with my walls. THANK YOU FOR All your 11/2/1

SINCERLY GARS AllEN 0321-02 WailuA Wall MAPAA HIGHIANDS WELL

0419-05

COMMISSION ON WATER RESOURCE MANAGEMENT

| TO: INIT. TO: INIT: FOR: PLEASE: CHENG, C. KUNIMURA. I. Approval See Me CHING, F. Signature Review & Com CHONG, R. OHYE, L. Information Take Action | |
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| CHING, F. 5 MILLS, D. 3 Signature Review & Communication Take Action | |
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| oy-Kapaa Highlands- As we've discussed I've included a los | 2 of |
| detail to continue building the necond (in case we have defend or further justify the decision). Greg Allen will no happy but he is aware of our concerns & has blen very invoice Marcras to try to have our concerns addressed - D | the |

LINDA LINGLE



LAURA H. THIELEN

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. DONNA FAY K. KIYOSAKI, P.E. LAWRENCE H. MIIKE, M.D., J.D.

KEN C. KAWAHARA, P.E.

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

January 5, 2009

0419-05 wcr1 def.ltr2

Mr. Marcus Frandsen High Plains Drilling

Dear Mr. Frandsen:

Abandonment and Permanent Sealing Required for Well No. 0419-05 (Kapaa Highlands Well 1, TMK (4) 4-3-003:001)

On December 10, 2008, we received the video log for Well No. 0419-05 (Kapaa Highlands Well 1), located on Kauai. Greg Allen sent the video in response to our request dated September 23, 2008. He also sent a copy of the daily logs you kept during your work at this well site; we received the daily logs on October 8, 2008.

Abandonment/Permanent Sealing of Well No. 0419-05 Required

We have completed our review of the video and your daily logs and conclude that the well does not comply with the well construction requirements set forth in the *Hawaii Well Construction & Pump Installation Standards* (HWCPIS) (2004). We are therefore unable to accept your Well Completion Report Part I, which we received on December 15, 2006, and we cannot authorize installation of a permanent pump in the well. We have stated our specific concerns about the finished well in previous correspondence (letters sent on January 2, 2007; June 12, 2007; August 26, 2008; and September 23, 2008).

This letter serves as notice to you and to Greg Allen, the well owner, that the well must be abandoned in accordance with Part 3 of the HWCPIS, and pursuant to the State Water Code (HRS § 174C-95) and § 13-168-16, HAR. You must obtain a well abandonment permit before starting this work. We are prepared to expedite processing of a well abandonment permit application for Well No. 0419-05 to finally resolve this matter. The usual application processing time is ninety (90) days from the date we receive a complete application.

Explanation

The notes in your daily log suggest that the hole is not plumb enough and/or the side walls are too unstable to allow for conversion to a properly constructed water well. In fact, we see from your notes that you tried to construct the well properly by attempting to place a solid casing to a depth of 170 feet, but neither an 8- nor a 6-inch-diameter casing could be advanced any deeper than 86 feet. To facilitate our analysis, we have transcribed the portions of your notes that describe your activities and decisions relating to reaming the hole and setting casings and grout, as follows.

| Date Recorded | Notes from Daily Drilling Log ¹ |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07 August 2006 | Noted after 187 to 200 ft interval: if we get any water need to case to here |
| 09 August 2006 | Tom Nance wants to ream well to 19" put 12" pipe to 170' do 48 hr test pump |
| 10 August 2006 | Going to ream hole to 10" put 8" pipe in & test pump then pull everything at a later date & ream to 19" & case to 12" 170' cement & test pump |
| 11 August 2006 | ream to 10" Reamed borehole to 163 ft then: Pulled out of hole Now I'll run 8" pipe to 163' |
| 15 August 2006 | Got ok on well 14 ¾" then put 8" pipe into 200' cement & test pump for 300 gpm |
| 16 August 2006 | Drilled from 160 to 203 ft, then noted: ready for 8" casing |
| 17 August 2006 | 90' total pipedrilled hole to 100' |
| 21 August 2006 | ready to cement well Apparently cemented over 2 ½ days (8/21 to 8/23); notes indicate 212 bags of cement used. |
| 25 August 2006 | drilled to 107' Looks like drilling continued to 147 ft |
| 26 August 2006 | 147-167 Looks like drilling continued to 167 ft |
| 26 September 2006 | Drilled 148 ft to 220 ft ready to case hole |
| 27 September 2006 | welded in 113' x 6" pipe – drove it in & it stopped dead. The 8" didn't follow to 12" hole – 6" won't follow to 8" hole – there is enough loose rock & clay that it must push pipe around – drilled down to 220' |
| 28 September 2006 | Drilled 240 to 260 ft and noted: Finished 500-600 gpm |
| 19 October 2006 (after pumping test) | 260' deep cemented to 200' 86' of 8'' casing & seal |

Note:

¹ Italicized text is verbatim from Marcus Frandsen's daily logs.

The video log shows several zones between about 95 and 200 feet below ground surface (ft bgs) where water is flowing into the borehole from the surrounding rock unit(s). Your daily logs confirm that you encountered several water-bearing zones down to 226 ft bgs, for which you noted estimated flows of 20 gallons per minute (gpm) up to 60 gpm. While these flows would not provide the quantity of water sought for the Kapaa Highlands development, ground water is present in quantities that would be sufficient to serve other smaller water needs. Based on the information available, we conclude that the materials between 155 and 226 ft bgs do not act as an "aquiclude" as stated in Tom Nance's report, dated October 27, 2006. Although less productive, these zones are not necessarily hydraulically separate from the lower-most water-bearing zone in the well bore (i.e., the bottom 40 feet) and not necessarily a different aquifer system.

Mr. Marcus Frandsen Page 3 January 5, 2009

According to your logs, Tom Nance recommended that you ream the borehole to 19-inch-diameter and then place a 12-inch casing to 170 ft bgs and seal the annular space. (Daily log entry on August 9, 2006, on table above.) This construction might have been acceptable, because it would have provided for sealing of the upper water-bearing zones and prevented wasting and mixing of deep ground water with water in shallower water-bearing zones. The well as currently constructed is not properly sealed and allows for wasting and mixing of deep and shallow waters.

It appears that during your attempt to ream the hole to a larger diameter and install solid casing, you had to redrill the hole more than once. We assume this is because the borehole was caving in places or otherwise unstable. Additionally, it appears that you tried to place a cement plug in the borehole and then drilled again through the cement. We note that you mixed and poured into the borehole a total of 212 bags of cement. If cement was in fact placed in the hole, we conclude based on our review of the video log that your attempt to seal the hole was unsuccessful; it is possible that some of the cement slurry was lost in the surrounding rock units and not retained in the borehole.

If you still believe you can construct an acceptable well in the existing borehole, you may submit a proposal for our consideration and you will be required to obtain a new well construction permit. If you decide to take this approach, you will be required to explain why you believe another attempt at well construction in this borehole might be successful. Please be aware that if we approve a new well construction permit, you will be required to perform another set of pumping tests to evaluate well performance and aquifer capacity to provide the desired water supply.

We note that the constant-rate pumping test done in October 2006 did not allow the water level to recover from drawdown during the step drawdown test. Also, the rate of drawdown during this test increased slightly toward the end of the pumping period. Although this site could be affected by tidal fluctuations, the increased drawdown at the end of the test could indicate that a fracture, formation or rock unit with a lower permeability than the principal producing strata was encountered during pumping. If this is the case, the proposed pump capacity could be too high for the well site. Whether you attempt to properly construct a well in this borehole or if you decide to construct a new well in the vicinity of this well, any further testing should be designed to assess the possible presence of a boundary or storage limitations in the aquifer.

Written Response Required in 30 Days

Please respond to this letter in writing within thirty (30) days. Your response should include your application for a well abandonment permit and an estimated schedule for the well abandonment work. Failure to respond within 30 days and failure to take the appropriate action could cause you to be subject to fines of up to \$5,000 per day, as authorized by the State Water Code (HRS Chapter 174C).

Please remember that use of water from this well for any purpose other than testing without a certificate of pump installation completion is a violation of the State Water Code and your original permit conditions for this well, and is subject to fines of up to \$5,000 per day.

If you have any questions or if you wish to discuss these matters with our staff, please call Denise Mills at

Sincerely,

KEN C. KAWAHARA, P.E.

Deputy Director

DEM:ss

c: Greg Allen

Notes for video log of Kapaa Highlands Well 1, Well No. 0419-05 (TMK (4) 4-3-003:001)

(DVD in well file.)

By: Denise Mills

Date: 12/24/2008

| Begin Time on video | Depth, ft (if known) | Observations/Comments* | | |
|------------------------|-------------------------|---------------------------------------------------------------------------------------------------------|----------------------------|--|
| | 14 | A lot of sediment on inside of well casing. | | |
| 4:00 | 75 to 83 | Casing to 83 ft bgs (?). Lost audio after 4 minutes. | | |
| 7:50 | > 83 | Looks like water flowing into borehole, appears to be uncased | | |
| 8:45 | > 83 | Possible water flow into borehole. | | |
| 9:14 | | Puka – lava tube? Est. 1.5 to 2 ft diameter (visual estimate). | | |
| 9:47 | | Lots of sediment, loose and sloughing into hole; clearly not lit | hified rock. | |
| 10:40-10:59 | | Blackout – lost video and sound. 49'-12c': | : clav • | |
| 10:59 | ~ 95 | | edullava | |
| 11:12-11:30 | | Blackout, no audio. beds | | |
| 12:27 | | Looks like water flowing into borehole, camera held at this de | pth. | |
| 12:42 | ~ 95 | Camera being lowered again. | | |
| 13:33 | ~ 95 (?) | Narrative: "We've been trying to get past an obstruction." Ca | mera raised. | |
| 13:56 | | Camera being lowered again. | | |
| 14:13 | ~ 96 | Camera hits obstruction again (same depth as at 13:33[?]). | | |
| 15:16 | ~ 96 | Camera maneuvered around obstruction; described as "shelf" of | on video. | |
| 15:28-15:29 | 100 | Rock "ledge" clearly visible. Probably a lava bed, massive str | | |
| 16:39 | > 100 | Vertical fracture or joint clearly visible, est. 1-2 ft long in range of camera view | | |
| 16:54 | > 100 | Water flowing into borehole at a fairly high rate (based on turbulence and eddying in the water column. | | |
| 17:50-19:26 | > 100 | Very blurry, dark image, no audio. Possible water flow into be | orehole. | |
| 19:26 | > 100 to 138 | Audio restored: "Went through shelf at 96 ft Another shelf | at 120 ft." | |
| 19:48 | 138 | Water flowing into borehole, camera is still. | - | |
| 20:01 | 140 | "Shelf' at 140 ft. Probably a lava bed. | | |
| 20:30 | 150 | A lot of sediment from camera hitting borehole side walls. | 155'-170' | |
| | 150 to 180 | A lot of sediment sloughing into hole. | "at least 20 | |
| 24:50-25:02 | 207 | Water flow into well bore; a lot of turbulence and mixing. | | |
| 25:48 | | Strong flow of water into well bore. | 200'-226'2 | |
| 26:24 | 217 | Another rock ledge visible in side walls (probably a lava bed). | | |
| 27:35 | 235 | Camera hung up on another obstruction. | 200'-226' ~ 233'-240' ~ | |
| 27:45 | 240 | Lots of water flow into well bore. 240'-260' | | |
| | 262 | Bottom of hole. 240'-260' 8st 500-600 gpm | | |
| 40:38 | 131 | "Shelf' visible, probably a lava bed. | | |
| 49:24 | 83 | Bottom of casing. | | |
| 54:55 | 86 | Audio: "Bottom of casing." | | |
| 1:00:23 | 83 | Still in casing, out of casing at 86 ft; not clear of cased to 83' of | or 86'WCR1 - | |

Mighal bor

* Notes added 12/28 - From M. Francisen's daily log.

-Good to 85'

| Date Recorded | Notes from Daily Drilling Log | |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
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Notes for video log of Kapaa Highlands Well 1, Well No. 0419-05 (TMK (4) 4-3-003:001) (DVD in well file.)

(DVD in well file.)

By: Denise Mills

Date: 12/24/2008

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| 15:16 | ~ 96 | Camera maneuvered around obstruction; described as "shelf" on video. |
| 15:28-15:29 | 100 | Rock "ledge" clearly visible. Probably a lava bed, massive structure. |
| 16:39 | > 100 | Vertical fracture or joint clearly visible, est. 1-2 ft long in range of camera view. |
| 16:54 | > 100 | Water flowing into borehole at a fairly high rate (based on turbulence and eddying in the water column. |
| 17:50-19:26 | > 100 | Very blurry, dark image, no audio. Possible water flow into borehole. |
| 19:26 | > 100 to 138 | Audio restored: "Went through shelf at 96 ft Another shelf at 120 ft." |
| 19:48 | 138 | Water flowing into borehole, camera is still. |
| 20:01 | 140 | "Shelf' at 140 ft. Probably a lava bed. |
| 20:30 | 150 | A lot of sediment from camera hitting borehole side walls. |
| | 150 to 180 | A lot of sediment sloughing into hole. |
| 24:50-25:02 | 207 | Water flow into well bore; a lot of turbulence and mixing. |
| 25:48 | | Strong flow of water into well bore. |
| 26:24 | 217 | Another rock ledge visible in side walls (probably a lava bed). |
| 27:35 | 235 | Camera hung up on another obstruction. |
| 27:45 | 240 | Lots of water flow into well bore. |
| | 262 | Bottom of hole. |
| 40:38 | 131 | "Shelf' visible, probably a lava bed. |
| 49:24 | 83 | Bottom of casing. |
| 54:55 | 86 | Audio: "Bottom of casing." |
| 1:00:23 | 83 | Still in casing, out of casing at 86 ft; not clear of cased to 83' or 86'. |



Denise E Mills/DLNR/StateHiUS 12/09/2008 03:05 PM

To Roy Hardy/DLNR/Statel

CC

bcc

Subject Kapaa Highlands well, 0419-04 --video on its way

Greg Allen found the video of the Kapaa Highlands well, which we requested.

This is the well that is shown to be grouted to 86 ft, then open hole to the bottom, for about a 192-ft open interval. He was going to mail the video on Monday, so it should arrive at our office today or tomorrow. Apparently the quality is pretty bad in places, because of sloughing from the borehole sidewalls during filming. C'est la vie, Greg did tell me that it shows clearly the grout depth and bottom interval of the hole.





Subject FW:

| | IS | | | | | | | | | | | | | | | | | | | | | | | | |
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Greg Allen 808-645-4500

Wal No. 0419-05

From: GAllen [ma Sent: Thursday, November 06, 2008 4:30 PM To: 'hpdrilling'; 'llueller' Subject: FW:

Marcus, do you have a camera you could send? Or any ideas?

Greg Allen

From: Denise.E.Mills

V [mailto:Denise.E.Mills

Sent: Thursday, October 09, 2008 8:16 AM

To: GAllen

Subject: RE:

Greg,
Just to clarify, we will still need to see a video log of the well. --Denise

That sounds correct. Thanks

Greg Allen

From: Denise.E.Mills@

Sent: Wednesday, October 08, 2008 1:11 PM

To: GAllen Subject: Re:

Thank you, Greg. We received the fax. I'll take some time to look it over and see what additional

| information it provides relating to how the well is construtionally the hole is open uncased and unsealed for an "GAllen" | ucted. Following a quick review, it still looks as interval of 192 feet. |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| 10/08/2008 11:47 AM | To <denise.e.mills cc="" subject<="" td=""></denise.e.mills> |
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| | |
| Aloha Denise, This is only part of the log. I am faxing it complete. | |
| Thanks, | |
| Greg Allen | |
| | |
| | |







Shook or Marcus, Do you have access to video equipment?

Greg Allen 808-645-4500

From: Denise.E.

Sent: Thursday, October 09, 2008 8:16 AM

To: GAllen Subject: RE:

Greg,

Just to clarify, we will still need to see a video log of the well. -- Denise

"GAllen"

10/08/2008 02:59 PM

cc SubjectRE:

That sounds correct. Thanks

Greg Allen

From: Denise.E. Sent: Wednesday, October 08, 2008 1:11 PM

To: GAllen
Subject: Re:

Thank you, Greg. We received the fax. I'll take some time to look it over and see what additional information it provides relating to how the well is constructed. Following a quick review, it still looks as though the hole is open -- uncased and unsealed for an interval of 192 feet.

"GAllen" <gallen

10/08/2008 11:47 AM

To<Denise.E.Mills

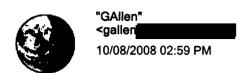
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Subject

Aloha Denise, This is only part of the log. I am faxing it complete.

Thanks,

Greg Allen



To <Denise.E.Mills

cc

bcc

Subject RE:

History: Pris message has been replied to.

That sounds correct. Thanks

Greg Allen

From: Denise.E.

Sent: Wednesday, October 08, 2008 1:11 PM

To: GAllen Subject: Re:

Thank you, Greg. We received the fax. I'll take some time to look it over and see what additional information it provides relating to how the well is constructed. Following a quick review, it still looks as though the hole is open -- uncased and unsealed for an interval of 192 feet.

"GAllen" <

To<Denise.E.Mills

10/08/2008 11:47 AM

cc Subject

Aloha Denise,

This is only part of the log. I am faxing it complete.

Thanks,

Greg Allen

TO DRAISE MILLS

FR GREG Allan

Scanned only 6 pass



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FAX:808

11:46AM

OCT-08-2008

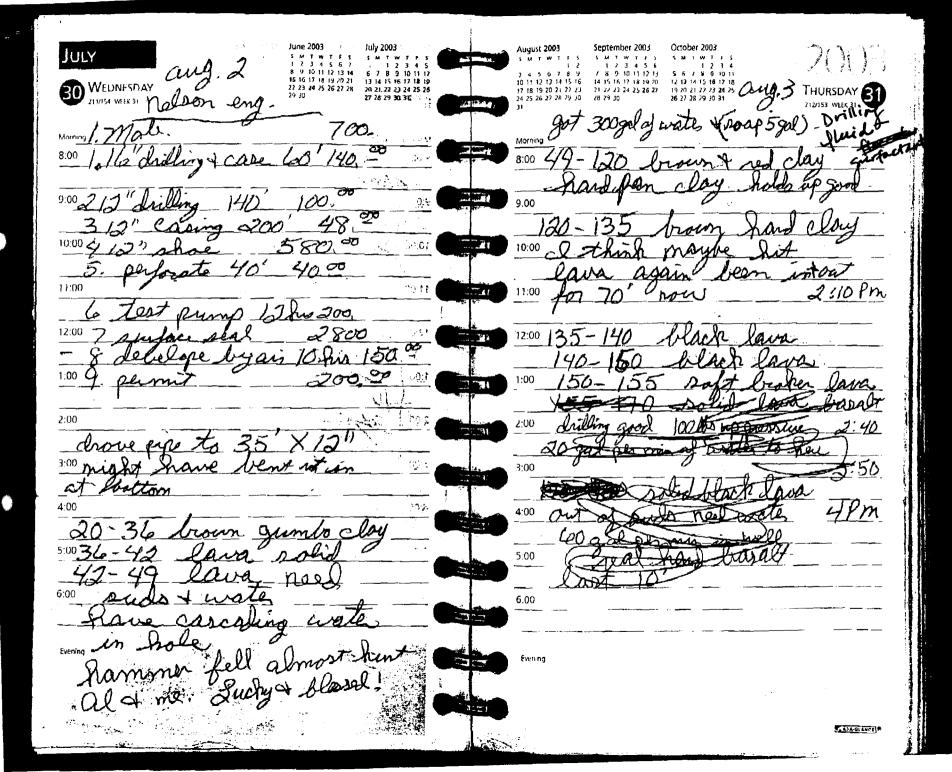
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| 10:00 166-200 soft clay 200-203 solid Granal | 11Am | $\frac{10:00 6}{7 20}$ 11:00 8 20 |
| ready for 8" caring | 10-11 | 11:00 8 20 9 20 12:00 10 20 |
| nice 10 × 20 + 1 show | × pc. | 1:00 Silled Spole to 100' |
| . 4Pm | | 2:00 pulley came off of hyd pump |
| 4.00 | 100%. | 3:00 that drive line hooks up to. |
| 5:00 | 0.00 | 5:00 pulled steel laid mast down |
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| 9:00 Ned more 4: 30 PM | 9:00 got 56 bags put them in Noon |
| 2 of Dieg man came of 11:00 helped 1:30-4P.M. | 11:00 3PM got 36 bags out them in man |
| 1:00 13.59 pubag | 1:00 get 10 more bay. |
| 3:00 | 2:00 3:00 put 18 lags in |
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| 2:00 107- 113 Sand lava 1 m. | 1:00 flow: | Levening Uegos |
| 122-127 lava set 4:3D 4:00 127-147 basalt to PM | Morning played tou | 23x129 WEEK 35 23 |
| 5.00 got 105 gal fuel 6:00 7:30 more | 9:00 10:00 | 3 00 |
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Allen

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Allen

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Allen

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Apr

| HIAL TIDE | 242 pm | |
|-----------|--------|----------|
| LOW TIDE | 845 pm | 10/19/06 |

| • | | | · |
|------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Tom | NAJCE WATER | - RESOURCE 1 | FLINEERING |
| 36739 | r | (37-114) | |
| END 37108 | 800 | | |
| G11 369, | 100 327 10 | 0088340 | |
| pond -2126/15 | | | |
| -//10- | 5EC/1000 GA 1 | (1:53.44) | DANW HOWN 8.75 |
| 17 | 153.66 | | 8 Z.76* |
| 17.30 | 153.72 | | 8' z. 764 |
| | 153.79 | | 8'7.48" |
| / 30 | 153.87 | | 8'7"- |
| 2 90 | 153.88 | | 3' 1.70° |
| 73 | 153.81 | | 8 1.5 |
| 3 | 153.79 | 3:17 2.17" | S 15# |
| 3:52 3/100 | 153.75 | 3:25 76.19/434 | 8 1.5 |
| 480 | 153.72 | | *8 1.5 |
| 430 | 153.59 | | 5'8 |
| 5:00 | 153.31 | | 8 7.5 |
| 12 V | 530 153.03 | | 8'3.4 |
| iv | 600 153.63 | - 8'3.9 | |
| | 23 152.91 | - 842 WATI | in Samples |
| CV | 200 15270 | 1-84.9 | |
| 3. | 230 750 15263 | 3 -8 3 3 3 | 5.3 531 GPM |
| 4 2 | 10-100 800 152.5 | 3-85.8 | |
| *6 V | 830 152.5 | 2 - 8.6.0 6 8-6.5 | |
| | 93= 152.6 | The state of the s | |
| ODOMA | | | · |

MEMO and ROUTE SLIP (ver. 09/09/08)

| W | /CR 1 Check for Well No | <u>0419-05</u> | _ (regu | lation/surv | ey route) | |
|----------|----------------------------------------------------|----------------|------------------------|-----------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. 2. | Pump Tests Check Diane England_ | | (initial) (initial) | | was incomplete. M submitted in piecen | submittal was on 12/15/2006 & issing information has been neal fashion in response to for information and deficiency |
| | benise | | | | 2007; postponed an addressed. Pumpin this routing is for the | est data was received on March' alysis until other deficiencies g test data analyzed 8/28/2008—att analysis only. Letters sent on the second of the second o |
| | | | Yes | <u>No</u> | | gust 4, 2008, and August 26, at pumping tests not done PIS. —D. Mills |
| | Step-Drawdown Test: followed WCF analysis attact | | DP DP | | l<70 gpm no test re | |
| | Constant Rate Test: followed WC | | _ | | gp | . 4. |
| | analysis attac | | | | l<50 gpm no test re | equired |
| | Potential Well Interference: | | | пЭ | | |
| | Potential Stream Impacts: | | | - 3 Ca | int evalua | te |
| ٠ | Additional Testing or Data Required: | | | □ Mo | re well con | sometim data |
| | Pump Test Comments Attached: | | ď | | video A | at this time |
| | Proposed Pump Capacity is OK.: | | | | | |
| 3. | Well Log Check Geology Code for Well | Index 6 | KL/Fm I | Name: <u>Ko</u> | <i>loa Voll</i> SD. Engl | and (initial) |
| 4. | Construction Check Mitch Ohye | | nitial) | lf no doo | | Torres(initial) |
| | | Yes_ | <u>No</u> | ii iio, des | cribe deficiency | Update database |
| | data complete followed Special Cond & elevati | ons 🗆 | | | | update database wy geo. code & pumping test analysis - m |
| | well database updated | | □ <u>Latitud</u> | l a | <u>Longitude</u> | pumping test |
| | | | Latitud | <u></u> | Longitudo | analysis - m |
| | NAI NAI | | | | | , |
| 5. | Charley/Denise/Ryan | (initial) tal | ke actior | n based or | n above analysis | |
| | ATTACHMENTS FOR PUMP INSTALLATION | I PERMIT (2x |): | not r | necessary – on | ly WCP or BOTH. |
| | 1 COVER LETTER 2 COUNTY COMMENTS (DWS/SMA) | |] | | | |
| | 3 DOH COMMENTS 4 DLNR COMMENTS (LD/OCCL/DHP) | | _ } | - To be s | ent to driller/pu | mp installer |
| | 5 WCR 1 Accept | | _ J | Tala | | |
| | 6 WELL CONST. COMPLETION CERTIFI | CATE | < | To La | naowner | |
| | | | | Ctoff in | ntarnal abaaka | |
| | | | | - Stall II | nternal checks | |
| ^ | | | | NCCC | aant data lut- | dotobaca) |
| 6. 7. | Roy (initial) check (El Susan Hoagbin (initial) | | CK 1/V | voce ac | cept date into | uatabase) |
| 8. | Ken (initial) signature | | | | | |
| 9. | | IP issue | date if | attached | d/required | |
| 10 | D. Charley/Denise/Ryan File | | | | | |

€ Jell No. 0419-05 Elev. Kapaa Highlands Depth (ft, 695) 14/12 O'mst 68/bgs 851 bgs Manue 1 Det G. Allen Warner to G. Allen open interval 192 A -granvater (est) 140 (170-1018) lave (001 ZIO'bgs principal to zer (2hr/2-1) 60 gpm fice (est) waterproducing Zone ~210-235 A he of 60 140 - 200 har (baself Stauta, at # 150 acts (-n1/10/ * Notes added 10/19/07 for Marcus Transfer polis logifdulling accord or M



Well ID:

0419-05 (Kapaa Highlands)

Analysis Date:

8/27/2008

Test Date:

10/19/2006 (data from T. Nance)

Analyzed by:

Denise Mills

Step-drawdown Test

Deviations from CWRM Requirements

None notable.

Other Comments

1. Specific capacity estimates. Calculated for four 30-minute steps.

| Total Elapsed Time (min) | Discharge (gpm) | Total Drawdown (ft) | Specific Capacity (gpm/ft) |
|-----------------------------|--------------------|------------------------|----------------------------------|
| 30 | 317 | 3.39 | 93.5 |
| 60 | 382 | 5.06 | 75.5 |
| 90 | 438 | 6.16 | 71.1 |
| 120 | 526 | 8.23 | 64.2 |

Notes:

- 1. Data from Tom Nance, collected for Kapaa Highlands.
- 2. Constant-rate test started at fourth and highest average pumping rate, and run for approximately 10 hours. Discharge rates ranged from 528-529 gpm, with an average rate of 526 gpm.
- 3. Data corrected for barometric effects.

Constant-rate Pumping Test

Deviations from CWRM Test Requirements

- 1. Well pumped at constant rate immediately following fourth step of step-drawdown test, without allowing time for water level recovery before starting constant-rate test.
- 2. Constant-rate pumping for 10 hours, average 526 gpm.
- 3. Analyzed last 6 hours of pumping data as well as recovery data, although >90% recovery in 2 minutes after pumping stopped. (See Comments, below.)

Drawdown Curve Comments

- 1. Data not adjusted for variable discharge, although adjustment could be done; recommend postponing variable discharge analysis until more data available. Remains unclear as to which formation the data represent as a consequence of the long (uncased) interval.
- 2. Used data from last 6 hours of final pumping phase for analysis for slope and parameter estimates. Water levels partially stabilized during first 4 hours of pumping. Late-time data probably represents releases from storage in aquifer in response to pumping stresses, rather than well losses and conditions near the well bore such as releases from the rock matrix, fractures, and/or pores.
- 3. Late-time responses could be interpreted as a barrier; however, additional testing is required for an accurate assessment.

Www.T 28,000 gt /day 5.

- 4. **K** = 75 ft/day; **T** = 13,000 ft²/day. These estimates are within the range expected for permeable basalt aquifers. Values estimated from last 6 hours of constant-rate pumping (assumes flow to well bore from aquifer storage during last 6 hours of pumping at an average rate of 526 gpm, and assumes that drawdown during first 4 hours (including steprate pumping) is from well losses. Does not account for variable pumping rates.
- 5. Included analysis of recovery data, although >90% recovery in 2 minutes after pumping stopped. Therefore, can use only early-time data for slope calculation in analysis. K and T estimates from recovery data: K = 250 ft/day, T = 43,000 ft²/day.
- 6. Specific conductance decreased slightly during test, remained in range of \sim 430-460 µmhos.

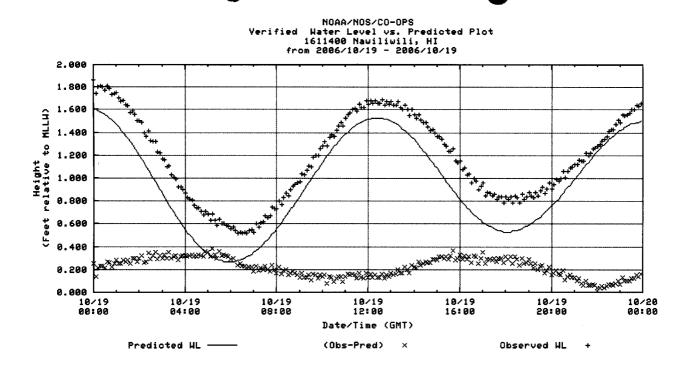
Well Interference & Stream Impacts

1. Potential for interference <u>not evaluated</u>. Well construction questionable, making it difficult to discern what may be delayed yield or a potential recharge source.

Other Comments

- 1. Solid casing extends to 86 ft bgs, confirmed by a video survey by T. Nance (telecomm, 8/29/2008). The upper shallow aquifer assumed to be properly sealed.
- 2. Report by T. Nance asserted in report to Kapaa Highlands that the interval between 80 and 210 ft bgs acts as an aquiclude, and that the productive zone in the well bore is between 210 and 260 ft bgs.
- 3. As a consequence of the long open-hole interval, the test pumping data may not discretely represent the deep aquifer (estimated to be 210-260 ft bgs; Nance, 10/27/2006). There is a reasonable potential that some recharge to the well bore during pumping was from strata lying between 86 and 210 ft bgs.

<u>Proposed Pump Capacity OK?</u>: Don't know. Further information needed on well construction and possibly properly designed constant-rate pumping test required to make this assessment.



28.0572 =SWL, before test began

10:45:00

10:46:00

10:47:00

0:45

0:46

0:47

45.0

46.0

47.0

23.402

23.4563

23.3859

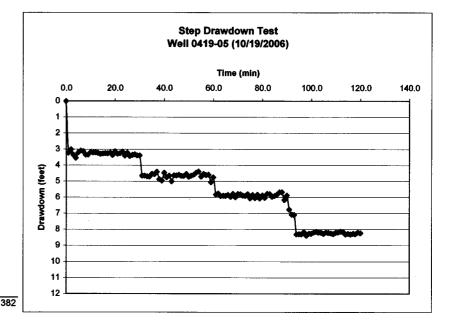
Step-Drawdown Test (0419-05)

| Time | Elasped Time | Elasped | | Atm | | Drawdown | |
|-----------|---------------------|------------|----------|----------|-------------------|----------|---------|
| (h:mm:ss) | (h:mm) | Time (min) | DTW (ft) | Pressure | SWL (ft) | (ft) | Q (gpm) |
| 10:00:00 | 0:00 | 0.0 | 28.0572 | 2.74158 | 13.31562 | 0 | 317 |
| 10:01:00 | 0:01 | 1.0 | 24.8313 | 2.74127 | 10.09003 | 3.22559 | |
| 10:02:00 | 0:02 | 2.0 | 25.0451 | 2.7413 | 10.3038 | 3.01182 | |
| 10:03:00 | 0:03 | 3.0 | 24.7072 | 2.74213 | 9.96507 | 3.35055 | |
| 10:04:00 | 0:04 | 4.0 | 24.5149 | 2.74227 | 9.77263 | 3.54299 | |
| 10:05:00 | 0:05 | 5.0 | 24.8518 | 2.74224 | 10.10956 | 3.20606 | |
| 10:06:00 | 0:06 | 6.0 | 24.9635 | 2.74174 | 10.22176 | 3.09386 | |
| 10:07:00 | 0:07 | 7.0 | 24.937 | 2.74197 | 10.19503 | 3.12059 | |
| 10:08:00 | 0:08 | 8.0 | 24.6999 | 2.74198 | 9.95792 | 3.3577 | |
| 10:09:00 | 0:09 | 9.0 | 24.7083 | 2.74174 | 9.96656 | 3.34906 | |
| 10:10:00 | 0:10 | 10.0 | 24.8695 | 2.74119 | 10.12831 | 3.18731 | |
| 10:11:00 | 0:11 | 11.0 | 24.8373 | 2.74082 | 10.09648 | 3.21914 | |
| 10:12:00 | 0:12 | 12.0 | 24.8548 | 2.74063 | 10.11417 | 3.20145 | |
| 10:13:00 | | 13.0 | 24.821 | 2.73911 | 10.08189 | 3.23373 | |
| 10:14:00 | 0:14 | 14.0 | 24.755 | 2.7387 | 10.0163 | 3.29932 | |
| 10:15:00 | | 15.0 | 24.7835 | 2.73835 | 10.0 4 515 | 3.27047 | |
| 10:16:00 | | 16.0 | 24.7995 | 2.73882 | 10.06068 | 3.25494 | |
| 10:17:00 | | 17.0 | 24.7894 | 2.73845 | 10.05095 | 3.26467 | |
| 10:18:00 | | 18.0 | 24.8254 | 2.73782 | 10.08758 | 3.22804 | |
| 10:19:00 | | 19.0 | 24.6741 | 2.73771 | 9.93639 | 3.37923 | |
| 10:20:00 | | 20.0 | 24.9149 | 2.73761 | 10.17729 | 3.13833 | |
| 10:21:00 | | 21.0 | 24.7535 | 2.73611 | 10.01739 | 3.29823 | |
| 10:22:00 | | 22.0 | 24.789 | 2.7362 | 10.0528 | 3.26282 | |
| 10:23:00 | | 23.0 | 24.8855 | 2.73577 | 10.14973 | 3.16589 | |
| 10:24:00 | | 24.0 | 24.6487 | 2.73572 | 9.91298 | 3.40264 | |
| 10:25:00 | | 25.0 | 24.83 | 2.73499 | 10.09501 | 3.22061 | |
| 10:26:00 | | 26.0 | 24.6163 | 2.73477 | 9.88153 | 3.43409 | |
| 10:27:00 | | 27.0 | 24.6899 | 2.73527 | 9.95463 | 3.36099 | |
| 10:28:00 | | 28.0 | 24.7239 | 2.73439 | 9.98951 | 3.32611 | |
| 10:29:00 | | 29.0 | 24.6587 | 2.73478 | 9.92392 | 3.3917 | |
| 10:30:00 | | 30.0 | 24.6565 | 2.7339 | 9.9226 | 3.39302 | 382 |
| 10:31:00 | | 31.0 | 23.3953 | 2.73311 | 8.66219 | 4.65343 | ' |
| 10:32:00 | | 32.0 | 23.3962 | 2.73407 | 8.66213 | 4.65349 | |
| 10:33:00 | | 33.0 | 23.3608 | 2.73344 | 8.62736 | 4.68826 | |
| 10:34:00 | | 34.0 | 23.3367 | 2.73296 | 8.60374 | 4.71188 | |
| 10:35:00 | | 35.0 | 23.5073 | 2.73222 | 8.77508 | 4.54054 | |
| 10:36:00 | | 36.0 | 23.4872 | 2.73228 | 8.75492 | 4.5607 | |
| 10:37:00 | | 37.0 | 23.6361 | 2.73202 | 8.90408 | 4.41154 | |
| 10:38:00 | | 38.0 | 23.1783 | 2.7318 | 8.4465 | 4.86912 | |
| 10:39:00 | | 39.0 | 23.0839 | 2.73202 | 8.35188 | 4.96374 | |
| 10:40:00 | | 40.0 | 23.5776 | 2.7321 | 8.8455 | 4.47012 | |
| 10:41:00 | | 41.0 | 23.2939 | 2.73142 | 8.56248 | 4.75314 | |
| 10:42:00 | | 42.0 | 23.3987 | 2.73274 | 8.66596 | 4.64966 | |
| 10:43:00 | | 43.0 | 23.0413 | 2.73268 | 8.30862 | 5.007 | |
| 10:44:00 | 0:44 | 44.0 | 23.4113 | 2.73194 | 8.67936 | 4.63626 | |

Pumping Rate (0419-05)

| Time (min) | Discharge (gpm) | total dd | SC (gpm/ft) |
|---------------|--------------------|----------|----------------|
| 30 | 317 | 3.39 | 93.46 |
| 60 | 382 | 5.06 | 75.49 |
| 90 | 438 | 6.16 | 71.09 |
| 120 | 528 | 8.23 | 64.19 |

Note: Step 4 pumping rate first at 486 (2 min.), then 495 (3 min.), then set at 528-529 gpm. Long-term test continued from 11:30, 10/19/2006 (see const rate tab)



8.66864

8.7238

8.65401

4.64698 4.59182

4.66161

2.73336

2.7325

2.73189

Step-Drawdown Test (0419-05)

Pumping Rate (0419-05)

| Time | Elasped Time | Elasped | | Atm | | Drawdown | | Time | Discharge | | sc |
|----------------------|--------------|--------------|--------------------|--------------------|--------------------|--------------------|---------|-------|-----------|----------|----------|
| (h:mm:ss) | (h:mm) | Time (min) | DTW (ft) | Pressure | SWL (ft) | (ft) | Q (gpm) | (min) | (gpm) | total dd | (gpm/ft) |
| 10:48:00 | 0:48 | 48.0 | 23.3752 | 2.73128 | 8.64392 | 4.6717 | | | | | |
| 10:49:00 | | 49.0 | 23.5031 | 2.7323 | 8.7708 | 4.54482 | | | | | |
| 10:50:00 | | 50.0 | 23.3231 | 2.7312 | 8.5919 | 4.72372 | | | | | |
| 10:51:00 | | 51.0 | 23.3973 | 2.73051 | 8.66679 | 4.64883 | | | | | |
| 10:52:00 | | 52.0 | 23.4503 | 2.73052 | 8.71978 | 4.59584 | | | | | |
| 10:53:00 | | 53.0 | 23.5824 | 2.73129 | 8.85111 | 4.46451 | | | | | |
| 10:54:00 | | 54.0 | 23.6551 | 2.73316 | 8.92194 | 4.39368 | | | | | |
| 10:55:00 | | 55.0 | 23.3308 | 2.73177 | 8.59903 | 4.71659 | | | | | |
| 10:56:00 | | 56.0 | 23.5087 | 2.73177 | 8.77693 | 4.53869 | | | | | |
| 10:57:00 | | 57.0 | 23.4319 | 2.73291 | 8.69899 | 4.61663 | | | | | |
| 10:58:00 | | 58.0 | 23.4522 | 2.73308 | 8.71912 | 4.5965 | | | | | |
| 10:59:00 | | 59.0 | 22.9875 | 2.73214 | 8.25536 | 5.06026 | | | | | |
| 11:00:00 | | 60.0 | 23.3 | 2.73193 | 8.56807 | 4.74755 | 438 | | | | |
| 11:01:00 | | 61.0 | 22.2174 | 2.73244 | 7.48496 | 5.83066 | | | | | |
| 11:02:00 | | 62.0 | 22.2859 | 2.731 | 7.5549 | 5.76072 | , | | | | |
| 11:03:00 | | 63.0 | 22.1215 | 2.73066 | 7.39084 | 5.92478 | | | | | |
| 11:04:00 | | 64.0 | 22.1489 | 2.72981 | 7.41909 | 5.89653 | | | | | |
| 11:05:00 | | 65.0 | 22.1381 | 2.73063 | 7.40747 | 5.90815 | | | | | |
| 11:06:00 | | 66.0 | 22.1983 | 2.73037 | 7.46793 | 5.84769 | | | | | |
| 11:07:00 | | 67.0 | 22.0727 | 2.72994 | 7.34276 | 5.97286 | | | | | |
| 11:08:00 | | 68.0 | 22.2689 | 2.72898 | 7.53992 | 5.7757 | | | | | |
| 11:09:00 | | 69.0 | 22.0471 | 2.72875 | 7.31835 | 5.99727 | | | | | |
| 11:10:00 | | 70.0 | 22.2535 | 2.72843 | 7.52507 | 5.79055 | | | | | |
| 11:11:00 | | 71.0 | 22.2317 | 2.72903 | 7.50267 | 5.81295 | | | | | |
| 11:12:00 | | 72.0 | 22.1581 | 2.72858 | 7.42952 | 5.8861 | | | | | |
| 11:13:00 | | 73.0 | 22.1306 | 2.72774 | 7.40286 | 5.91276 | | | | | |
| 11:14:00 | | 74.0 | 22.2448 | 2.72843 | 7.51637 | 5.79925 | | | | | |
| 11:15:00 | | 75.0 | 21.98 | 2.72713 | 7.25287 | 6.06275 | | | | | |
| 11:16:00 | | 76.0 | 22.1901 | 2.72685 | 7.46325 | 5.85237 | | | | | |
| 11:17:00 | | 77.0 | 21.9886 | 2.72674 | 7.26186 | 6.05376 | | | | | |
| 11:18:00 | | 78.0 | 22.2166 | 2.72722 | 7.48938 | 5.82624 | | | | | |
| 11:19:00 | | 79.0 | 21.9755 | 2.72732 | 7.24818 | 6.06744 | | | | | |
| 11:20:00 | | 80.0 | 22.1583 | 2.72579 | 7.43251 | 5.88311 | | | | | |
| 11:21:00 11:22:00 | | 81.0 82.0 | 22.014 | 2.72436 | 7.28964 | 6.02598 | | | | | |
| 11:23:00 | | 83.0 | 22.2736 22.2448 | 2.72407 2.72539 | 7.54953 | 5.76609 5.79621 | | | | | |
| 11:24:00 | | 84.0 | 22.2448 | 2.72329 | 7.51941 7.35701 | 5.95861 | | | | | |
| 11:25:00 | | 85.0 | 22.0003 | 2.72405 | 7.40095 | 5.91467 | | | | | |
| 11:26:00 | | 86.0 | 22.2227 | 2.72374 | 7.49896 | 5.81666 | | | | | |
| 11:27:00 | | 87.0 | 22.3614 | 2.72432 | 7.63708 | 5.67854 | | | | | |
| 11:28:00 | | 88.0 | 22.3584 | 2.7236 | 7.6348 | 5.68082 | | | | | |
| 11:29:00 | | 89.0 | 21.8788 | 2.72431 | 7.15449 | 6.16113 | | | | | |
| 11:30:00 | | 90.0 | 22.1594 | 2.72314 | 7.43626 | 5.87936 | 513 | | | | |
| 11:31:00 | | 91.0 | 21.2851 | 2.72399 | 6.56111 | 6.75451 | 313 | | | | |
| 11:32:00 | | 92.0 | 20.9692 | 2.72296 | 6.24624 | 7.06938 | | | | | |
| 11:33:00 | | 93.0 | 20.9556 | 2.72321 | 6.23239 | 7.08323 | | | | | |
| 11:34:00 | | 94.0 | 19.7458 | 2.72247 | 5.02333 | 8.29229 | | | | | |
| 11:35:00 | | 95.0 | 19.7499 | 2.72209 | 5.02781 | 8.28781 | | | | | |
| 11:36:00 | | 96.0 | 19.7376 | 2.72123 | 5.01637 | 8.29925 | | | | | |
| | | | | | | | | | | | |

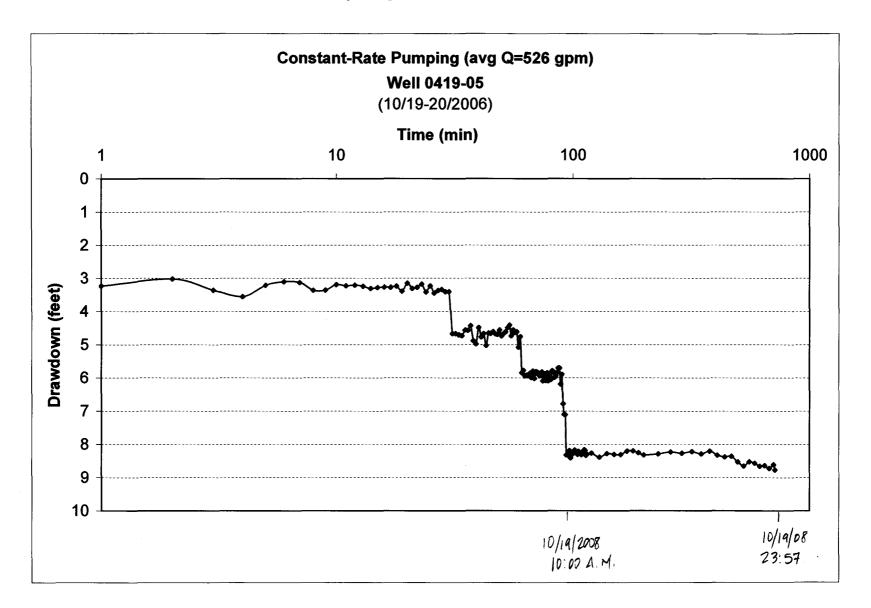
Kapaa Highlands, Well No. 0419-05

Step-Drawdown Test (0419-05)

Pumping Rate (0419-05)

| Time | Elasped Time | Elasped | | Atm | | Drawdown | | Time | Discharge | | sc |
|-----------|--------------|------------|----------|----------|----------|----------|---------|-------|-----------|----------|----------|
| (h:mm:ss) | (h:mm) | Time (min) | DTW (ft) | Pressure | SWL (ft) | (ft) | Q (gpm) | (min) | (gpm) | total dd | (gpm/ft) |
| 11:37:00 | 1:37 | 97.0 | 19.8794 | 2.7217 | 5.1577 | 8.15792 | | | | | |
| 11:38:00 | 1:38 | 98.0 | 19.6566 | 2.72092 | 4.93568 | 8.37994 | | | | | |
| 11:39:00 | 1:39 | 99.0 | 19.7811 | 2.72005 | 5.06105 | 8.25457 | | | | | |
| 11:40:00 | 1:40 | 100.0 | 19.7777 | 2.71982 | 5.05788 | 8.25774 | | | | | |
| 11:41:00 | 1:41 | 101.0 | 19.844 | 2.71855 | 5.12545 | 8.19017 | | | | | |
| 11:42:00 | 1:42 | 102.0 | 19.8921 | 2.71706 | 5.17504 | 8.14058 | | | | | |
| 11:43:00 | 1:43 | 103.0 | 19.8487 | 2.71626 | 5.13244 | 8.18318 | | | | | |
| 11:44:00 | 1:44 | 104.0 | 19.8495 | 2.71627 | 5.13323 | 8.18239 | | | | | |
| 11:45:00 | 1:45 | 105.0 | 19.7625 | 2.71539 | 5.04711 | 8.26851 | | | | | |
| 11:46:00 | 1:46 | 106.0 | 19.8558 | 2.71513 | 5.14067 | 8.17495 | | | | | |
| 11:47:00 | 1:47 | 107.0 | 19.8202 | 2.71532 | 5.10488 | 8.21074 | | | | | |
| 11:48:00 | 1:48 | 108.0 | 19.7955 | 2.71524 | 5.08026 | 8.23536 | | | | | |
| 11:49:00 | 1:49 | 109.0 | 19.7527 | 2.71263 | 5.04007 | 8.27555 | | | | | |
| 11:50:00 | 1:50 | 110.0 | 19.8326 | 2.71205 | 5.12055 | 8.19507 | | | | | |
| 11:51:00 | 1:51 | 111.0 | 19.8535 | 2.71148 | 5.14202 | 8.1736 | | | | | |
| 11:52:00 | 1:52 | 112.0 | 19.9002 | 2.71138 | 5.18882 | 8.1268 | | | | | |
| 11:53:00 | 1:53 | 113.0 | 19.8809 | 2.71057 | 5.17033 | 8.14529 | | | | | |
| 11:54:00 | 1:54 | 114.0 | 19.7334 | 2.71101 | 5.02239 | 8.29323 | | | | | |
| 11:55:00 | 1:55 | 115.0 | 19.7639 | 2.71031 | 5.05359 | 8.26203 | | | | | |
| 11:56:00 | 1:56 | 116.0 | 19.7216 | 2.70946 | 5.01214 | 8.30348 | | | | | |
| 11:57:00 | 1:57 | 117.0 | 19.7708 | 2.70944 | 5.06136 | 8.25426 | | | | | |
| 11:58:00 | 1:58 | 118.0 | 19.7369 | 2.70938 | 5.02752 | 8.2881 | | | | | |
| 11:59:00 | 1:59 | 119.0 | 19.8408 | 2.70932 | 5.13148 | 8.18414 | | | | | |
| 12:00:00 | 2:00 | 120.0 | 19.7988 | 2.70889 | 5.08991 | 8.22571 | | | | | |

Kapaa Highlands, Well No. 0419-05



WELL ID: 0419-05 (Kapaa Highlands)

INPUT Construction: Casing dia. (d_c) 16 Inch Annulus dia. (dw) 16 Inch Screen Length (L) 174 Feet Depths to: water level (DTW) 13 Feet Top of Aquifer 86 Feet Base of Aquifer 260 Feet Annular Fill: across screen -- Open Hole above screen -- Cement Aguifer Material -- Permeable Basalt

526 GPM

Island: Kauai Test Date: 10/19/2006 Analysis Date: 8/27/2008

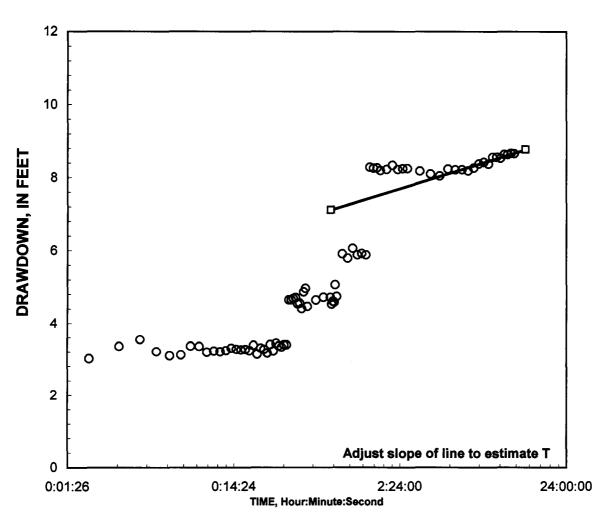
COMPUTED

Aquifer thickness = 174 Feet

Slope = 1.4188034 Feet/log10

Input is consistent.

| K | = | 75 | Feet/Day | _ |
|---|---|----|------------------------|---|
| T | = | | Feet ² /Day | - |



REMARKS:

FLOW RATE

Cooper-Jacob analysis of single-well aquifer test

Analysis Program: USGS Aquifer Test Analysis Spreadsheets v.1.2, Open File Report 02-197



| | Reduced Data | | | | |
|----------|----------------------------------|--------------|-----------------|-----------------|-------------|
| | Time, | Water Level | | Time, | Water Level |
| Entry | Date Hr:Min:Sec | Feet | Entry | Date Hr:Min:Sec | Feet |
| 1 | 1/0/00 0:00:03 | 0.00 | 51 [°] | 1/0/00 1:10:00 | 5.79 |
| 2 | 1/0/00 0:01:00 | 3.23 | | | |
| 3 | 1/0/00 0:02:00 | 3.01 | | | |
| | | | | | |
| 4 | 1/0/00 0:03:00 | 3.35 | | | |
| 5 | 1/0/00 0:04:00 | 3.54 | | | |
| 6 | 1/0/00 0:05:00 | 3.21 | | | |
| 7 | 1/0/00 0:06:00 | 3.09 | | | |
| 8 | 1/0/00 0:07:00 | 3.12 | | | |
| 9 | 1/0/00 0:08:00 | 3.36 | | | |
| 10 | 1/0/00 0:09:00 | 3.35 | | | |
| 11 | 1/0/00 0:10:00 | 3.19 | | | |
| 12 | 1/0/00 0:11:00 | 3.22 | | | |
| | | | | | |
| 13 | 1/0/00 0:12:00 | 3.20 | | | |
| 14 | 1/0/00 0:13:00 | 3.23 | | | |
| 15 | 1/0/00 0:14:00 | 3.30 | | | |
| 16 | 1/0/00 0:15:00 | 3.27 | | | |
| 17 | 1/0/00 0:16:00 | 3.25 | | | |
| 18 | 1/0/00 0:17:00 | 3.26 | | | |
| 19 | 1/0/00 0:18:00 | 3.23 | | | |
| 20 | 1/0/00 0:19:00 | 3.38 | | | |
| 21 | 1/0/00 0:20:00 | 3.14 | | | |
| 22 | 1/0/00 0:21:00 | 3.30 | | | |
| 23 24 | 1/0/00 0:22:00 | 3.26 | | | |
| 24 25 | 1/0/00 0:23:00 | 3.17 | | | |
| 26 | 1/0/00 0:24:00 1/0/00 0:25:00 | 3.40 3.22 | | | |
| 20 27 | 1/0/00 0:25:00 | 3.43 | | | |
| | | | | | |
| 28 | 1/0/00 0:27:00 | 3.36 | | | |
| 29 | 1/0/00 0:28:00 | 3.33 | | | |
| 30 | 1/0/00 0:29:00 | 3.39 | | | |
| 31 32 | 1/0/00 0:30:00 1/0/00 0:31:00 | 3.39 | | | |
| 33 | 1/0/00 0:31:00 | 4.65 4.65 | | | |
| 34 | 1/0/00 0:32:00 | 4.69 | | | |
| 35 | 1/0/00 0:33:00 | 4.71 | | | |
| 36 | 1/0/00 0:34:00 | 4.54 | | | |
| 37 | 1/0/00 0:36:00 | 4.56 | | | |
| 38 | 1/0/00 0:37:00 | 4.41 | | | |
| 39 | 1/0/00 0:38:00 | 4.87 | | | |
| 40 | 1/0/00 0:39:00 | 4.96 | | | |
| 41 | 1/0/00 0:40:00 | 4.47 | | | |
| 42 | 1/0/00 0:45:00 | 4.65 | | | |
| 43 | 1/0/00 0:50:00 | 4.72 | | | |
| 44 | 1/0/00 0:55:00 | 4.72 | | | |
| 45 | 1/0/00 0:56:00 | 4.54 | | | |
| 46 | 1/0/00 0:57:00 | 4.62 | | | |
| 47 | 1/0/00 0:58:00 | 4.60 | | | |
| 48 | 1/0/00 0:59:00 | 5.06 | | | |
| 49 | 1/0/00 1:00:00 | 4.75 | | | |
| 50 | 1/0/00 1:05:00 | 5.91 | | | |
| | | | | | |

Kapaa Highlands, Well No. 0419-05

Constant Rate Pumping 0419-05

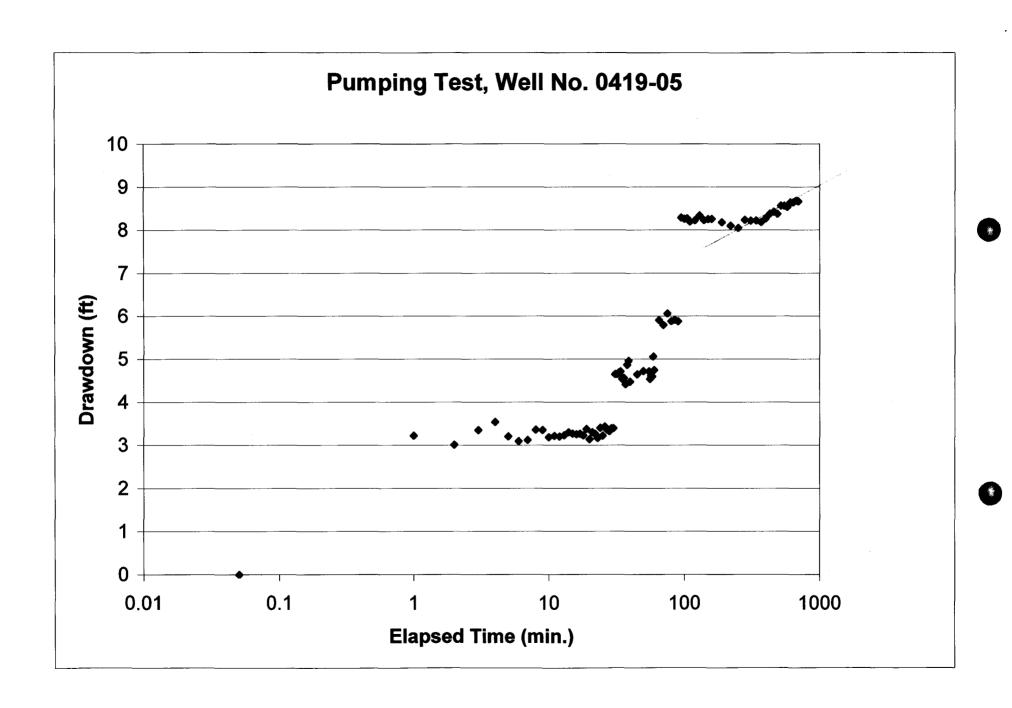
| | | Olistant Nato 1 | amping 0+10-00 | ing 0419-05 | | | |
|-----------|--------------|-----------------|----------------|---------------|---------------|-----------|-----------------------------------------|
| Time | Elasped Time | 1871 /54 | | Drawdown (ft) | Pump Rate | | |
| (h:mm:ss) | (min) | WL (ft) | Corr WL (ft) | | (gpm) | | 500 |
| 10:00:00 | | 28.0572 | 13.31562 | 0 | | average Q | |
| 10:01:00 | | 24.8313 | 10.09003 | 3.22559 | | 80% rec | 1.732052 |
| 10:02:00 | | 25.0451 | 10.3038 | 3.01182 | | | |
| 10:03:00 | | 24.7072 | 9.96507 | 3.35055 | | | |
| 10:04:00 | | 24.5149 | 9.77263 | 3.54299 | | | |
| 10:05:00 | | 24.8518 | 10.10956 | 3.20606 | | | Pumping Test, Well No. 0419-05 |
| 10:06:00 | | 24.9635 | 10.22176 | 3.09386 | | | t uniping 103t, Won 110. 0410-00 |
| 10:07:00 | | 24.937 | 10.19503 | 3.12059 | | | |
| 10:08:00 | | 24.6999 | 9.95792 | 3.3577 | 10 — | | |
| 10:09:00 | | 24.7083 | 9.96656 | 3.34906 | 9 + | | |
| 10:10:00 | 10 | 24.8695 | 10.12831 | 3.18731 | 8 — | | |
| 10:11:00 | | 24.8373 | 10.09648 | 3.21914 | 7 | | |
| 10:12:00 | 12 | 24.8548 | 10.11417 | 3.20145 | Drawdown (ff) | | |
| 10:13:00 | 13 | 24.821 | 10.08189 | 3.23373 | 8 5 | | |
| 10:14:00 | | 24.755 | 10.0163 | 3.29932 | § 3 | | • |
| 10:15:00 | 15 | 24.7835 | 10.04515 | 3.27047 | € 4 ⊤ | | A . • • A. Marriello |
| 10:16:00 | 16 | 24.7995 | 10.06068 | 3.25494 | 3 | | • • • • • • • • • • • • • • • • • • • • |
| 10:17:00 | 17 | 24.7894 | 10.05095 | 3.26467 | 2 — | | |
| 10:18:00 | 18 | 24.8254 | 10.08758 | 3.22804 | 1 + | | |
| 10:19:00 | 19 | 24.6741 | 9.93639 | 3.37923 | 0 | | |
| 10:20:00 | 20 | 24.9149 | 10.17729 | 3.13833 | 0.01 | 0.1 | 1 10 100 1000 |
| 10:21:00 | 21 | 24.7535 | 10.01739 | 3.29823 | | | Elapsed Time (min.) |
| 10:22:00 | 22 | 24.789 | 10.0528 | 3.26282 | | | |
| 10:23:00 | 23 | 24.8855 | 10.14973 | 3.16589 | | | |
| 10:24:00 | 24 | 24.6487 | 9.91298 | 3.40264 | | | |
| 10:25:00 | 25 | 24.83 | 10.09501 | 3.22061 | | | |
| 10:26:00 | | 24.6163 | 9.88153 | 3.43409 | | | |
| 10:27:00 | | 24.6899 | 9.95463 | 3.36099 | | | |
| 10:28:00 | | 24.7239 | 9.98951 | 3.32611 | | | |
| 10:29:00 | | 24.6587 | 9.92392 | 3.3917 | | | |
| 10:30:00 | | 24.6565 | 9.9226 | 3.39302 | | | |
| 10:31:00 | | 23.3953 | 8.66219 | 4.65343 | | | |
| 10:32:00 | | 23.3962 | 8.66213 | 4.65349 | | | |
| 10:33:00 | | 23.3608 | 8.62736 | 4.68826 | | | |
| 10:34:00 | | 23.3367 | 8.60374 | 4.71188 | | | |
| 10:35:00 | | 23.5073 | 8.77508 | 4.54054 | | | |
| 10:36:00 | | 23.4872 | 8.75492 | 4.5607 | | | |
| 10:37:00 | | 23.6361 | 8.90408 | 4.41154 | | | |

| 10:38:00 38 10:39:00 39 10:40:00 40 10:45:00 45 10:50:00 50 10:55:00 55 10:56:00 56 10:57:00 57 10:58:00 58 10:59:00 60 11:00:00 60 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 90 11:45:00 105 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | VL (ft) 23.1783 | Corr WL (ft) | Drawdown (ft) | Pump Rate |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------|---------------|-----------|
| 10:38:00 38 10:39:00 39 10:40:00 40 10:45:00 45 10:50:00 50 10:55:00 55 10:56:00 56 10:57:00 57 10:58:00 58 10:59:00 60 11:00:00 60 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 90 11:45:00 105 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | | | Drawdown (it) | |
| 10:39:00 39 10:40:00 40 10:45:00 45 10:50:00 50 10:55:00 55 10:56:00 56 10:57:00 57 10:58:00 58 10:59:00 59 11:00:00 60 11:05:00 75 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 90 11:45:00 105 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 23.1783 | | | (gpm) |
| 10:40:00 | | 8.4465 | 4.86912 | |
| 10:45:00 45 10:50:00 50 10:55:00 55 10:56:00 56 10:57:00 57 10:58:00 58 10:59:00 59 11:00:00 60 11:05:00 70 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 23.0839 | 8.35188 | 4.96374 | |
| 10:50:00 50 10:55:00 55 10:56:00 56 10:57:00 57 10:58:00 58 10:59:00 59 11:00:00 60 11:05:00 70 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 23.5776 | 8.8455 | 4.47012 | |
| 10:55:00 55 10:56:00 56 10:57:00 57 10:58:00 58 10:59:00 59 11:00:00 60 11:05:00 65 11:10:00 70 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 23.402 | 8.66864 | 4.64698 | |
| 10:56:00 56 10:57:00 57 10:58:00 58 10:59:00 59 11:00:00 60 11:05:00 65 11:10:00 70 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 23.3231 | 8.5919 | 4.72372 | |
| 10:57:00 57 10:58:00 58 10:59:00 59 11:00:00 60 11:05:00 65 11:10:00 70 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 23.3308 | 8.59903 | 4.71659 | |
| 10:58:00 58 10:59:00 59 11:00:00 60 11:05:00 70 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 23.5087 | 8.77693 | 4.53869 | |
| 10:59:00 59 11:00:00 60 11:05:00 65 11:10:00 70 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 23.4319 | 8.69899 | 4.61663 | |
| 11:00:00 60 11:05:00 65 11:10:00 70 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 23.4522 | 8.71912 | 4.5965 | |
| 11:05:00 65 11:10:00 70 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 22.9875 | 8.25536 | 5.06026 | |
| 11:05:00 65 11:10:00 70 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 23.3 | 8.56807 | 4.74755 | |
| 11:15:00 75 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 22.1381 | 7.40747 | 5.90815 | |
| 11:20:00 80 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 22.2535 | 7.52507 | 5.79055 | |
| 11:25:00 85 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 21.98 | 7.25287 | 6.06275 | |
| 11:30:00 90 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 22.1583 | 7.43251 | 5.88311 | |
| 11:35:00 95 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 22.125 | 7.40095 | 5.91467 | |
| 11:40:00 100 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 22.1594 | 7.43626 | 5.87936 | |
| 11:45:00 105 11:50:00 110 12:00:00 120 12:10:00 130 | 19.7499 | 5.02781 | 8.28781 | |
| 11:50:00 110 12:00:00 120 12:10:00 130 | 19.7777 | 5.05788 | 8.25774 | |
| 12:00:00 120 12:10:00 130 | 19.7625 | 5.04711 | 8.26851 | |
| 12:10:00 130 | 19.8326 | 5.12055 | 8.19507 | |
| | 19.7988 | 5.08991 | 8.22571 | |
| | 19.681 | 4.97697 | 8.33865 | |
| 12:20:00 140 | 19.7878 | 5.08923 | 8.22639 | |
| 12:30:00 150 | 19.7611 | 5.067 | 8.24862 | |
| 12:40:00 160 | 19.7546 | 5.06498 | 8.25064 | |
| 13:10:00 190 | 19.8082 | 5.13574 | 8.17988 | |
| 13:40:00 220 | 19.868 | 5.21304 | 8.10258 | |
| 14:10:00 250 | 19.9173 | 5.26816 | 8.04746 | |
| 14:40:00 280 | 19.7239 | 5.07821 | 8.23741 | |
| 15:10:00 310 | 19.7424 | 5.09759 | 8.21803 | |
| 15:40:00 340 | 19.7379 | 5.09502 | 8.2206 | |
| 16:10:00 370 | 19.7747 | 5.13017 | 8.18545 | |
| 16:40:00 400 | 19.6963 | 5.04986 | 8.26576 | |
| 17:10:00 430 | 19.5887 | 4.93646 | 8.37916 | |
| 17:40:00 460 | 19.5597 | 4.89337 | 8.42225 | |
| 18:10:00 490 | 19.6174 | 4.93971 | 8.37591 | |
| 18:40:00 520 | 19.4386 | 4.75218 | 8.56344 | |

Kapaa Highlands, Well No. 0419-05

Constant Rate Pumping 0419-05

| | | | amping 0 1 10 00 | <u> </u> | |
|-------------------|--------------------|-------------|------------------|---------------|--------------------|
| Time (h:mm:ss) | Elasped Time (min) | WL (ft) | Corr WL (ft) | Drawdown (ft) | Pump Rate (gpm) |
| 19:10:00 | 550 | 19.4521 | 4.7529 | 8.56272 | |
| 19:40:00 | 580 | 19.4922 | 4.7847 | 8.53092 | |
| 20:10:00 | 610 | 19.3932 | 4.67876 | 8.63686 | |
| 20:40:00 | 640 | 19.4044 | 4.68273 | 8.63289 | |
| 21:10:00 | 670 | 19.3767 | 4.64757 | 8.66805 | |
| 21:40:00 | 700 | 19.3896 | 4.65536 | 8.66026 | |



WELL ID: 0419-05, Kapaa Highlands

| | INPUT |
|--------------------------------|------------------|
| Construction: | |
| Casing dia. (d _c) | 16 Inch |
| Annulus dia. (d _w) | 16 Inch |
| Screen Length (L) | 174 Feet |
| Depths to: | |
| water level (DTW) | 13 Feet |
| Top of Aquifer | 86 Feet |
| Base of Aquifer | 260 Feet |
| Annular Fill: | |
| across screen | Open Hole |
| above screen | Cement |
| Aquifer Material | Permeable Basalt |
| FLOW RATE | 526 GPM |

Local ID: 0419-05 Date: 10/19/2006 Time: 10:00

COMPUTED

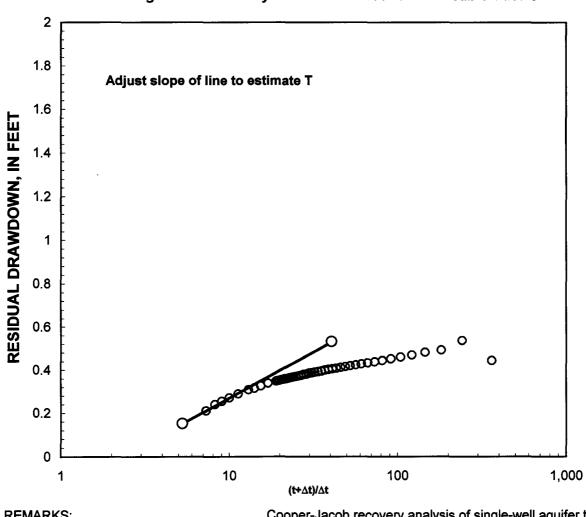
Aquifer thickness = 170 Feet

Slope = 0.42841037 Feet/log10

Input is consistent.

| K | = | 250 | Feet/Day |
|---|---|-------|------------------------|
| Т | = | 43000 | Feet ² /Day |

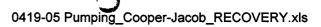
K= 250 is greater than likely maximum of 100 for Permeable Basalt



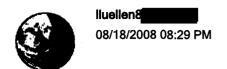
REMARKS:

Cooper-Jacob recovery analysis of single-well aquifer test

Hypothetical recovery test



| | | | | 04 19-05 Pullipling_C | ooper-Jacob_r |
|----------|-------------------|----------------|-------|-----------------------|---------------|
| | Reduced Data | 387-411 | | - | |
| | Time, | Water Level | | Time, | Water Level |
| Entry | | Feet | Entry | | Feet |
| 1 | 10/19/06 10:00:00 | 13.32 | 51 | 10/19/06 23:57:00 | 13.10 |
| 2 | 10/19/06 22:02:00 | 4.59 | | | |
| 3 | 10/19/06 22:03:00 | 11.30 | | | |
| 4 | 10/19/06 22:04:00 | 12.87 | | | |
| 5 | 10/19/06 22:05:00 | 12.78 | | | |
| 6 | 10/19/06 22:06:00 | 12.82 | | | |
| 7 | 10/19/06 22:07:00 | 12.83 | | | |
| 8 | 10/19/06 22:08:00 | 12.85 | | | |
| 9 | 10/19/06 22:09:00 | 12.86 | | | |
| 10 | 10/19/06 22:10:00 | 12.86 | | | |
| 11 | 10/19/06 22:11:00 | 12.87 | | | |
| 12 | 10/19/06 22:11:00 | 12.88 | | | |
| | 10/19/06 22:13:00 | | | | |
| 13 14 | 10/19/06 22:14:00 | 12.88 | | | |
| 15 | 10/19/06 22:15:00 | 12.89 12.89 | | | |
| 16 | 10/19/06 22:16:00 | 12.09 | | | |
| 17 | 10/19/06 22:17:00 | 12.90 | | | |
| 18 | 10/19/06 22:18:00 | 12.90 | | | |
| 19 | 10/19/06 22:19:00 | 12.90 | | | |
| 20 | 10/19/06 22:20:00 | 12.91 | | | |
| 21 | 10/19/06 22:21:00 | 12.91 | | | |
| 22 | 10/19/06 22:22:00 | 12.92 | | | |
| 23 | 10/19/06 22:23:00 | 12.92 | | | |
| 24 | 10/19/06 22:24:00 | 12.92 | | | |
| 25 | 10/19/06 22:25:00 | 12.93 | | | * |
| 26 | 10/19/06 22:26:00 | 12.93 | | | |
| 27 | 10/19/06 22:27:00 | 12.93 | | | |
| 28 | 10/19/06 22:28:00 | 12.93 | | | |
| 29 | 10/19/06 22:29:00 | 12.94 | | | |
| 30 | 10/19/06 22:30:00 | 12.94 | | | |
| 31 | 10/19/06 22:31:00 | 12.94 | | | |
| 32 | 10/19/06 22:32:00 | 12.95 | | | |
| 33 | 10/19/06 22:33:00 | 12.95 | | | |
| 34 | 10/19/06 22:34:00 | 12.95 | | | |
| 35 | 10/19/06 22:35:00 | 12.95 | | | |
| 36 | 10/19/06 22:36:00 | 12.95 | | | |
| 37 | 10/19/06 22:37:00 | 12.96 | | | |
| 38 | 10/19/06 22:38:00 | 12.96 | | | |
| 39 | 10/19/06 22:39:00 | 12.96 | | | |
| 40 | 10/19/06 22:40:00 | 12.96 | | | |
| 41 | 10/19/06 22:41:00 | 12.96 | | | |
| 42 | 10/19/06 22:42:00 | 12.97 | | | |
| 43 | 10/19/06 22:47:00 | 12.98 | | | |
| 44 | 10/19/06 22:52:00 | 12.99 | | | |
| 45 | 10/19/06 22:57:00 | 13.00 | | | |
| 46 | 10/19/06 23:02:00 | 13.01 | | | |
| 47 | 10/19/06 23:12:00 | 13.03 | | | |
| 48 | 10/19/06 23:22:00 | 13.04 | | | |
| 49 | 10/19/06 23:32:00 | 13.06 | | | |
| 50 | 10/19/06 23:42:00 | 13.08 | | | |



To Denise.E.Mills

cc

bcc

Subject Fwd:

----Original Message----

From: GAllen To: lluellen8

Sent: Fri, 15 Aug 2008 8:00 am

Subject: FW: FW:

Greg Allen

From: Tom Nance [mailto:

Sent: Thursday, August 14, 2008 4:40 PM

To: GAllen
Subject: Re: FW:

Greg:

The data I collected is compiled in the attached excel spreadsheet.

Tom

On Thu, Aug 14, 2008 at 3:06 PM, GAllen < > wrote:

Tom, Shook is working with the state to clean up Marcus permits... They want to know if you have the "field numbers" raw data from the pump test at Kapaa highlands?

Greg Allen

From: <u>lluellen8</u> mailto

Sent: Thursday, August 14, 2008 2:41 PM

To:

Subject: Re:

greg, can you see if Tom Nance has the field numbers (raw data) for the pump test on your Kapaa High Lands well. Thanks Shook Denise at State would like them.

----Original Message---From: GAllen <
To: lluellen8
Cc: hpdrilling
Sent: Tue, 12 Aug 2008 3:47 pm
Shook, I hope this info helps.
Marcus, Please come finish my well.

Greg Allen

It's time to go back to school! Get the latest trends and gadgets that make the grade on AOL Shopping.

Tom Nance Water Resource Engineering
Tel:

圖

Get the MapQuest Toolbar. Directions, Traffic, Gas Prices & More! PumpTest.xls

Water Level Recording Data

Step Test Performance

| Time | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curve | |
|----------|-----|------|-------------------|---------------------------------------|-----------|---------|----------|----------|-----|---------|----------|----------------------------|
| | | | | 40/40/00 0.00 | | | | | | | | |
| 10:00:00 | 31 | | | 10/19/06 9:2 | | | 13.32777 | 9:27:00 | | 17 3.3 | | |
| 10:03:00 | 31 | | | 10/19/06 9:2 | | | 13.32976 | | | 32 4.64 | | |
| 10:07:00 | 31 | | | 10/19/06 9:29 | | | 13.31973 | 9:29:00 | | 38 5.89 | | |
| 10:14:00 | 317 | | | 10/19/06 9:3 | | | 13.31383 | 9:30:00 | | 29 8.25 | | |
| 10:26:00 | 31 | | | 10/19/06 9:3 | | | 13.31269 | 9:31:00 | | 20 | 0.065146 | |
| 10:29:59 | 31 | | <u>5 443</u> 57cρ | 10/19/06 9:3 | | | 13.31202 | | | 30 | 0.105014 | |
| 10:30:00 | 38 | | | 10/19/06 9:3 | | | 13.31282 | | | 10 | 0.149746 | |
| 10:34:00 | 38: | | | 10/19/06 9:3 | | | 13.31415 | | | 50 | 0.199343 | |
| 10:43:00 | 38 | | | 10/19/06 9:3 | | | 13.31458 | 9:35:00 | | 30 | 0.253802 | |
| 10:55:00 | 38 | | () () | 10/19/06 9:3 | | | 13.31385 | 9:36:00 | | 70 | 0.313126 | |
| 10:59:59 | 38 | | | 10/19/06 9:3 | | 2.73808 | 13.31432 | | | 30 | 0.377314 | |
| 11:00:00 | 43 | | | 10/19/06 9:3 | | | 13.31445 | | | 90 | 0.446365 | |
| 11:04:00 | 43 | | | 10/19/06 9:3 | | | 13.31567 | 9:39:00 | | 00 | 0.52028 | |
| 11:16:00 | 43 | | 0 430 | 10/19/06 9:4 | | | 13.31622 | | | 10 | 0.599059 | |
| 11:25:00 | 43 | | () A | 10/19/06 9:4 | | | 13.31576 | | | 20 | 0.682702 | |
| 11:29:59 | 43 | | 429010 | 10/19/06 9:4 | | | 13.31779 | | | 30 | 0.771208 | |
| 11:30:00 | 48 | | ** 1 / 1 - | 10/19/06 9:4 | | | 13.31772 | | | 10 | 0.864578 | |
| 11:32:00 | 49 | | | 10/19/06 9:4 | | | 13.31794 | 9:44:00 | | 50 | 0.962813 | |
| 11:35:00 | 52 | | | 10/19/06 9:4 | | | 13.31635 | 9:45:00 | | 30 | 1.06591 | |
| 12:00:00 | 52 | | | | | | 13.31637 | 9:46:00 | | 70 | 1.173872 | |
| 12:30:00 | 52 | | | | | | 13.31607 | 9:47:00 | | 30 | 1.286698 | |
| 13:00:00 | 52 | | | | | | 13.31726 | | | 90 | 1.404387 | |
| 13:30:00 | | | | | | | 13.31665 | | | 00 | 1.52694 | |
| 14:00:00 | 52 | | 53. | | | | 13.31528 | 9:50:00 | | 10 | 1.654357 | |
| 14:30:00 | 52 | | 53. | | | | 13.31755 | | | 20 | 1.786638 | |
| 15:00:00 | | | 53. | | | | 13.31784 | 9:52:00 | | 30 | 1.923782 | |
| 15:30:00 | | | 53. | | | | 13.31655 | | | 10 | 2.06579 | |
| 16:00:00 | | | 53. | | | | 13.31669 | 9:54:00 | | 50 | 2.212663 | |
| 16:30:00 | | | 53. | | | | 13.31678 | | | 30 | 2.364398 | |
| 17:00:00 | | | 53. | | | | 13.31788 | 9:56:00 | | 70 | 2.520998 | |
| 17:30:00 | | | 53. | | | | 13.31686 | | | 30 | 2.682462 | |
| 18:00:00 | | | 53. | | | | 13.31734 | | | 90 | 2.848789 | |
| 18:30:00 | | | 52. | · · · · · · · · · · · · · · · · · · · | | | 13.31757 | 9:59:00 | | 00 | 3.01998 | |
| 19:00:00 | | | 52. | | | | 13.31562 | | | 10 | | Start pumping @ 10:00 A.M. |
| 19:30:00 | | | 52. | | | | 10.09003 | 10:01:00 | | 20 | 3.376954 | SWL= 28.0572 |
| 20:00:00 | | | 52. | | | | | | | 30 | 3.562736 | |
| 20:30:00 | | | 52. | | | | | | | 10 | 3.753382 | |
| 21:00:00 | | | 52. | | | | | | | 50 | 3.948893 | |
| 21:30:00 | | | | .6 10/19/06 10:0 | | | 10.10956 | | | 30 | 4.149266 | |
| 22:00:00 | 53 | 3 | 52. | | | | 10.22176 | | | 70 | 4.354504 | |
| | | | | 10/19/06 10:0 | | | 10.19503 | | | 30 | 4.564606 | |
| Avg CR = | 52 | 6 | | 10/19/06 10:0 | | | | | | 90 | 4.779571 | |
| | | | | 10/19/06 10:0 | | | | | | 00 | 4.9994 | |
| | | | | 10/19/06 10:1 | | | 10.12831 | 10:10:00 | | 10 | 5.224093 | |
| | | | | 10/19/06 10:1 | | | 10.09648 | | | 20 | 5.45365 | |
| | | | | 10/19/06 10:1 | | | 10.11417 | | | 30 | 5.68807 | |
| | | | | 10/19/06 10:1 | | | 10.08189 | | | 10 | 5.927354 | |
| | | | | 10/19/06 10:1 | | | | | | 50 | 6.171503 | |
| | | | | 10/19/06 10:1 | | | 10.04515 | | | 30 | 6.420514 | |
| | | | | 10/19/06 10:1 | 6 24.7995 | 2.73882 | 10.06068 | 10:16:00 | 47 | 70 | 6.67439 | |
| | | | | | | | | | | | | |

Received by comma

Water Level Recording Data Step Test Performance **Manually Collected Data SWL** Time **GPM GPM** SpCond Data Baro DRWDN Curve Time Time 2.73845 10.05095 24.7894 480 10/19/06 10:17 10:17:00 6.93313 10/19/06 10:18 24.8254 2.73782 10.08758 10:18:00 490 7.196733 9.93639 10:19:00 500 7.4652 10/19/06 10:19 24.6741 2.73771 7.738531 10/19/06 10:20 24.9149 2.73761 10.17729 10:20:00 510 10/19/06 10:21 24.7535 2.73611 10.01739 10:21:00 520 8.016726 10/19/06 10:22 24.789 2.7362 10.0528 10:22:00 530 8.299784 2.73577 10.14973 540 10/19/06 10:23 24.8855 10:23:00 8.587706 24.6487 2.73572 9.91298 10:24:00 550 8.880493 10/19/06 10:24 10.09501 10/19/06 10:25 24.83 2.73499 10:25:00 560 9.178142 10/19/06 10:26 24.6163 2.73477 9.88153 10:26:00 570 9.480656 10/19/06 10:27 24.6899 2.73527 9.95463 10:27:00 580 9.788034 24.7239 2.73439 9.98951 10:28:00 10.10027 10/19/06 10:28 590 24.6587 2.73478 9.92392 10:29:00 10/19/06 10:29 9.9226 10/19/06 10:30 24.6565 2.7339 10:30:00 10/19/06 10:31 23.3953 2.73311 8.66219 10:31:00 10/19/06 10:32 23.3962 2.73407 8.66213 10:32:00 10/19/06 10:33 23.3608 2.73344 8.62736 10:33:00 2.73296 8.60374 10:34:00 10/19/06 10:34 23.3367 10/19/06 10:35 23.5073 2.73222 8.77508 10:35:00 8.75492 10/19/06 10:36 23.4872 2.73228 10:36:00 10/19/06 10:37 23.6361 2.73202 8.90408 10:37:00 10/19/06 10:38 23.1783 2.7318 8.4465 10:38:00 23.0839 2.73202 8.35188 10/19/06 10:39 10:39:00 10/19/06 10:40 23.5776 2.7321 8.8455 10:40:00 2.73142 10/19/06 10:41 23.2939 8.56248 10:41:00 10/19/06 10:42 23.3987 2.73274 8.66596 10:42:00 2.73268 8.30862 10/19/06 10:43 23.0413 10:43:00 8.67936 10/19/06 10:44 23.4113 2.73194 10:44:00 10/19/06 10:45 23.402 2.73336 8.66864 10:45:00 10/19/06 10:46 23.4563 2.7325 8.7238 10:46:00 10/19/06 10:47 23.3859 2.73189 8.65401 10:47:00 10/19/06 10:48 23.3752 2.73128 8.64392 10:48:00 23.5031 2.7323 8.7708 10:49:00 10/19/06 10:49 10/19/06 10:50 23.3231 2.7312 8.5919 10:50:00 10/19/06 10:51 23.3973 2.73051 8.66679 10:51:00 10/19/06 10:52 23.4503 2.73052 8.71978 10:52:00 10/19/06 10:53 23.5824 2.73129 8.85111 10:53:00 10/19/06 10:54 23.6551 2.73316 8.92194 10:54:00 10/19/06 10:55 23.3308 2.73177 8.59903 10:55:00 10/19/06 10:56 23.5087 2.73177 8.77693 10:56:00 8.69899 10/19/06 10:57 23.4319 2.73291 10:57:00 10/19/06 10:58 23.4522 2.73308 8.71912 10:58:00 10/19/06 10:59 22.9875 2.73214 8.25536 10:59:00 8.56807 10/19/06 11:00 23.3 2.73193 11:00:00 10/19/06 11:01 22.2174 2.73244 7.48496 11:01:00 10/19/06 11:02 22.2859 2.731 7.5549 11:02:00 10/19/06 11:03 22.1215 2.73066 7.39084 11:03:00 22.1489 2.72981 7.41909 11:04:00 10/19/06 11:04

2.73063

2.73037

22.1381

22.1983

7.40747

7.46793 11:06:00

11:05:00

10/19/06 11:05

10/19/06 11:06

Water Level Recording Data

| ime | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
|-----|-----|------|--------|----------------|---------|---------|---------|----------|-----|-------|-------|
| | | | | 10/19/06 11:07 | 22.0727 | 2.72994 | 7.34276 | 11:07:00 | | | |
| | | | | 10/19/06 11:08 | | 2.72898 | 7.53992 | 11:08:00 | | | |
| | | | | 10/19/06 11:09 | | 2.72875 | 7.31835 | 11:09:00 | | | |
| | | | | 10/19/06 11:10 | | 2.72843 | 7.52507 | 11:10:00 | | | |
| | | | | 10/19/06 11:11 | | 2.72903 | 7.50267 | 11:11:00 | | | |
| | | | | 10/19/06 11:12 | 22.1581 | 2.72858 | 7.42952 | 11:12:00 | | | |
| | | | | 10/19/06 11:13 | | 2.72774 | 7.40286 | 11:13:00 | | | |
| | | | | 10/19/06 11:14 | 22.2448 | | 7.51637 | 11:14:00 | | | |
| | | | | 10/19/06 11:15 | 21.98 | 2.72713 | 7.25287 | 11:15:00 | | | |
| | | | | 10/19/06 11:16 | 22.1901 | 2.72685 | 7.46325 | 11:16:00 | | | |
| | | | | 10/19/06 11:17 | 21.9886 | 2.72674 | 7.26186 | 11:17:00 | | | |
| | | | | 10/19/06 11:18 | | 2.72722 | 7.48938 | 11:18:00 | | | |
| | | | | 10/19/06 11:19 | 21.9755 | 2.72732 | 7.24818 | 11:19:00 | | | |
| | | | | 10/19/06 11:20 | | | 7.43251 | 11:20:00 | | | |
| | | | | 10/19/06 11:21 | 22.014 | 2.72436 | 7.28964 | 11:21:00 | | | |
| | | | | 10/19/06 11:22 | 22.2736 | 2.72407 | 7.54953 | 11:22:00 | | | |
| | | | | 10/19/06 11:23 | 22.2448 | 2.72539 | 7.51941 | 11:23:00 | | | |
| | | | | 10/19/06 11:24 | | | 7.35701 | 11:24:00 | | | |
| | | | | 10/19/06 11:25 | 22.125 | 2.72405 | 7.40095 | 11:25:00 | | | |
| | | | | 10/19/06 11:26 | | 2.72374 | 7.49896 | 11:26:00 | | | |
| | | | | 10/19/06 11:27 | | | 7.63708 | 11:27:00 | | | |
| | | | | 10/19/06 11:28 | 22.3584 | 2.7236 | 7.6348 | 11:28:00 | | | |
| | | | | 10/19/06 11:29 | 21.8788 | 2.72431 | 7.15449 | 11:29:00 | | | |
| | | | | 10/19/06 11:30 | | | 7.43626 | 11:30:00 | | | |
| | | | | 10/19/06 11:31 | 21.2851 | 2.72399 | 6.56111 | 11:31:00 | | | |
| | | | | 10/19/06 11:32 | | | 6.24624 | 11:32:00 | | | |
| | | | | 10/19/06 11:33 | | | 6.23239 | 11:33:00 | | | |
| | | | | 10/19/06 11:34 | | | 5.02333 | 11:34:00 | | | |
| | | | | 10/19/06 11:35 | | | 5.02781 | 11:35:00 | | | |
| | | | | 10/19/06 11:36 | 19.7376 | | 5.01637 | 11:36:00 | | | |
| | | | | 10/19/06 11:37 | | 2.7217 | 5.1577 | 11:37:00 | | | |
| | | | | 10/19/06 11:38 | | | 4.93568 | 11:38:00 | | | |
| | | | | 10/19/06 11:39 | | 2.72005 | 5.06105 | 11:39:00 | | | |
| | | | | 10/19/06 11:40 | | 2.71982 | 5.05788 | 11:40:00 | | | |
| | | | | 10/19/06 11:41 | 19.844 | | 5.12545 | 11:41:00 | | | |
| | | | | 10/19/06 11:42 | | 2.71706 | 5.17504 | 11:42:00 | | | |
| | | | | 10/19/06 11:43 | | | 5.13244 | 11:43:00 | | | |
| | | | | 10/19/06 11:44 | | | 5.13323 | 11:44:00 | | | |
| | | | | 10/19/06 11:45 | | | 5.04711 | 11:45:00 | • | | |
| | | | | 10/19/06 11:46 | | | 5.14067 | 11:46:00 | | | |
| | | | | 10/19/06 11:47 | | | 5.10488 | 11:47:00 | | | |
| | | | | 10/19/06 11:48 | | | 5.08026 | 11:48:00 | | | |
| | | | | 10/19/06 11:49 | | | 5.04007 | 11:49:00 | | | |
| | | | | 10/19/06 11:50 | | 2.71205 | 5.12055 | 11:50:00 | | | |
| | | | | 10/19/06 11:51 | 19.8535 | | 5.14202 | 11:51:00 | | | |
| | | | | 10/19/06 11:52 | | | 5.18882 | 11:52:00 | | | |
| | | | | 10/19/06 11:53 | | | 5.17033 | 11:53:00 | | | |
| | | | | 10/19/06 11:54 | | | 5.02239 | 11:54:00 | | | |
| | | | | 10/19/06 11:55 | | 2.71031 | 5.05359 | 11:55:00 | | | |
| | | | | 10/19/06 11:56 | | | 5.01214 | | | | |

Water Level Recording Data Step Test Performance Manually Collected Data **GPM** DRWDN Curve **GPM SpCond** Data Baro SWL Time Time Time 2.70944 5.06136 11:57:00 10/19/06 11:57 19.7708 10/19/06 11:58 19.7369 2.70938 5.02752 11:58:00 10/19/06 11:59 19.8408 2.70932 5.13148 11:59:00 5.08991 12:00:00 10/19/06 12:00 19.7988 2.70889 19.8102 2.70817 5.10203 12:01:00 10/19/06 12:01 2.70744 5.11146 12:02:00 10/19/06 12:02 19.8189 10/19/06 12:03 19.7741 2.70816 5.06594 12:03:00 10/19/06 12:04 19.8063 2.70776 5.09854 12:04:00 10/19/06 12:05 19.6869 2.70946 4.97744 12:05:00 19.7203 2.70679 5.01351 12:06:00 10/19/06 12:06 10/19/06 12:07 19.7549 2.70617 5.04873 12:07:00 2.70568 5.02052 12:08:00 10/19/06 12:08 19.7262 10/19/06 12:09 19.7053 2.70427 5.00103 12:09:00 10/19/06 12:10 19.681 2.70403 4.97697 12:10:00 10/19/06 12:11 19.8348 2.70344 5.13136 12:11:00 10/19/06 12:12 19.8737 2.70289 5.17081 12:12:00 5.04046 10/19/06 12:13 19.7427 2.70224 12:13:00 10/19/06 12:14 19.7801 2.70119 5.07891 12:14:00 10/19/06 12:15 19.7928 2.70229 5.09051 12:15:00 2.7009 12:16:00 10/19/06 12:16 19.8762 5.1753 10/19/06 12:17 19.7577 2.70091 5.05679 12:17:00 2.69882 5.09128 12:18:00 10/19/06 12:18 19.7901 10/19/06 12:19 19.7576 2.69857 5.05903 12:19:00 2.69857 5.08923 12:20:00 10/19/06 12:20 19.7878 5.13063 12:21:00 10/19/06 12:21 19.8275 2.69687 19.8163 2.69746 5.11884 12:22:00 10/19/06 12:22 10/19/06 12:23 19.7875 2.69721 5.09029 12:23:00 10/19/06 12:24 19.8549 2.6958 5.1591 12:24:00 10/19/06 12:25 19.6965 2.69536 5.00114 12:25:00 10/19/06 12:26 19.8608 2.69543 5.16537 12:26:00 10/19/06 12:27 19.8589 2.69515 5.16375 12:27:00 10/19/06 12:28 19.6986 2.69385 5.00475 12:28:00 2.69487 5.13363 12:29:00 10/19/06 12:29 19.8285 12:30:00 10/19/06 12:30 19.7611 2.6941 5.067 2.69363 5.07747 12:31:00 19.7711 10/19/06 12:31 10/19/06 12:32 19.7948 2.69419 5.10061 12:32:00 10/19/06 12:33 19.7479 2.69287 5.05503 12:33:00 2.6916 5.0678 12:34:00 10/19/06 12:34 19.7594 5.08756 12:35:00 10/19/06 12:35 19.7791 2.69154 10/19/06 12:36 19.7188 2.69174 5.02706 12:36:00 2.69061 5.08579 12:37:00 10/19/06 12:37 19.7764 10/19/06 12:38 19.8301 2.68924 5.14086 12:38:00 10/19/06 12:39 19.7989 2.68921 5.10969 12:39:00 5.06498 12:40:00 10/19/06 12:40 19.7546 2.68962 10/19/06 12:41 19.7208 2.68754 5.03326 12:41:00 10/19/06 12:42 19.7667 2.68725 5.07945 12:42:00 10/19/06 12:43 19.7955 2.68611 5.10939 12:43:00 19.7703 2.68348 5.08682 12:44:00 10/19/06 12:44 10/19/06 12:45 19.6874 2.68509 5.00231 12:45:00 2.6833 5.1147 12:46:00

10/19/06 12:46

19.798

Water Level Recording Data

| Time | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
|------|-----|------|--------|----------------|---------|---------|---------|----------|-----|-------|-------|
| | | | | 10/19/06 12:47 | 19.7785 | 2.68209 | 5.09641 | 12:47:00 | | | |
| | | | | 10/19/06 12:48 | 19.7352 | 2.682 | 5.0532 | | | | |
| | | | | 10/19/06 12:49 | 19.7112 | 2.68171 | 5.02949 | 12:49:00 | | | |
| | | | | 10/19/06 12:50 | 19.8651 | 2.67991 | 5.18519 | 12:50:00 | | | |
| | | | | 10/19/06 12:51 | 19.7618 | 2.67951 | 5.08229 | 12:51:00 | | | |
| | | | | 10/19/06 12:52 | 19.8821 | 2.6795 | 5.2026 | 12:52:00 | | | |
| | | | , | 10/19/06 12:53 | 19.7515 | 2.67886 | 5.07264 | 12:53:00 | | | |
| | | | | 10/19/06 12:54 | 19.9104 | 2.67871 | 5.23169 | 12:54:00 | | | |
| | | | | 10/19/06 12:55 | 19.7724 | 2.67736 | 5.09504 | 12:55:00 | | | |
| | | | | 10/19/06 12:56 | 19.6996 | 2.67768 | 5.02192 | 12:56:00 | | | |
| | | | | 10/19/06 12:57 | 19.6926 | 2.67764 | 5.01496 | 12:57:00 | | | |
| | | | | 10/19/06 12:58 | 19.7256 | 2.67627 | 5.04933 | 12:58:00 | | | |
| | | | | 10/19/06 12:59 | 19.8491 | 2.67549 | 5.17361 | 12:59:00 | | | |
| | | | | 10/19/06 13:00 | 19.8626 | 2.67507 | 5.18753 | 13:00:00 | | | |
| | | | | 10/19/06 13:01 | 19.8285 | 2.67834 | 5.15016 | 13:01:00 | | | |
| | | | | 10/19/06 13:02 | 19.8324 | 2.67533 | 5.15707 | 13:02:00 | | | |
| | | | | 10/19/06 13:03 | 19.7732 | 2.67519 | 5.09801 | 13:03:00 | | | |
| | | | | 10/19/06 13:04 | 19.7732 | 2.67558 | 5.09762 | 13:04:00 | | • | |
| | | | | 10/19/06 13:05 | 19.8799 | 2.67431 | 5.20559 | 13:05:00 | | | |
| | | | | 10/19/06 13:06 | 19.7106 | 2.67442 | 5.03618 | 13:06:00 | | | |
| | | | | 10/19/06 13:07 | 19.8259 | 2.6743 | 5.1516 | 13:07:00 | | | |
| | | | | 10/19/06 13:08 | 19.7134 | 2.67354 | 5.03986 | 13:08:00 | | | |
| | | | | 10/19/06 13:09 | 19.7778 | 2.6736 | 5.1042 | 13:09:00 | | | |
| | | | | 10/19/06 13:10 | 19.8082 | 2.67246 | 5.13574 | 13:10:00 | | | |
| | | | | 10/19/06 13:11 | 19.7443 | 2.67175 | 5.07255 | 13:11:00 | | | |
| | | | | 10/19/06 13:12 | 19.7667 | 2.6708 | 5.0959 | | | | |
| | | | | 10/19/06 13:13 | 19.7573 | 2.67016 | 5.08714 | 13:13:00 | | | |
| | | | | 10/19/06 13:14 | 19.7905 | 2.66919 | 5.12131 | 13:14:00 | | | |
| | | | | 10/19/06 13:15 | 19.8297 | 2.67046 | 5.15924 | 13:15:00 | | | |
| | | | | 10/19/06 13:16 | 19.7572 | 2.66921 | 5.08799 | 13:16:00 | | | |
| | | | | 10/19/06 13:17 | 19.8779 | 2.66856 | 5.20934 | 13:17:00 | | | |
| | | | | 10/19/06 13:18 | 19.7182 | 2.66765 | 5.05055 | 13:18:00 | | | |
| | | | | 10/19/06 13:19 | 19.747 | 2.6676 | 5.0794 | 13:19:00 | | | |
| | | | | 10/19/06 13:20 | 19.7425 | 2.66762 | 5.07488 | | | | |
| | | | | 10/19/06 13:21 | 19.7501 | 2.66688 | 5.08322 | 13:21:00 | | | |
| | | | | 10/19/06 13:22 | 19.7814 | 2.66628 | 5.11512 | 13:22:00 | | | |
| | | | | 10/19/06 13:23 | 19.6913 | 2.66401 | 5.02729 | 13:23:00 | | | |
| | | | | 10/19/06 13:24 | 19.765 | 2.66414 | 5.10086 | 13:24:00 | | | |
| | | | | 10/19/06 13:25 | 19.7044 | 2.66338 | 5.04102 | 13:25:00 | | | |
| | | | | 10/19/06 13:26 | 19.7406 | 2.66259 | 5.07801 | 13:26:00 | | | |
| | | | | 10/19/06 13:27 | 19.7606 | 2.66111 | 5.09949 | 13:27:00 | | | |
| | | | | 10/19/06 13:28 | 19.8364 | 2.6634 | 5.173 | 13:28:00 | | | |
| | | | | 10/19/06 13:29 | 19.8779 | 2.66159 | 5.21631 | 13:29:00 | | | |
| | | | | 10/19/06 13:30 | 19.8363 | 2.66197 | 5.17433 | 13:30:00 | | | |
| | | | | 10/19/06 13:31 | 19.886 | 2.66026 | 5.22574 | 13:31:00 | | | - |
| | | | | 10/19/06 13:32 | 19.6934 | 2.65915 | 5.03425 | | | | |
| | | | | 10/19/06 13:33 | | 2.65846 | 5.21564 | | | | |
| | | | | 10/19/06 13:34 | 19.8412 | 2.65883 | 5.18237 | 13:34:00 | | | |
| | | | | 10/19/06 13:35 | | 2.65869 | 5.04821 | 13:35:00 | | | |
| | | | | 10/19/06 13:36 | | 2.65897 | 5.05973 | | | | |

Water Level Recording Data Step Test Performance Manually Collected Data SpCond Data Baro SWL Time **GPM** DRWDN Curve **GPM** Time Time 19.7939 2.65846 5.13544 13:37:00 10/19/06 13:37 10/19/06 13:38 19.8107 2.65616 5.15454 13:38:00 19.866 2.6571 5.2089 13:39:00 10/19/06 13:39 19.868 2.65496 5.21304 13:40:00 10/19/06 13:40 10/19/06 13:41 19.8497 2.65499 5.19471 13:41:00 5.13889 13:42:00 10/19/06 13:42 19.7943 2.65541 19.7909 2.65522 5.13568 13:43:00 10/19/06 13:43 10/19/06 13:44 19.7318 2.65422 5.07758 13:44:00 2.65413 10/19/06 13:45 19.8328 5.17867 13:45:00 10/19/06 13:46 19.8326 2.65471 5.17789 13:46:00 10/19/06 13:47 19.7434 2.65303 5.09037 13:47:00 19.7938 2.65218 5.14162 10/19/06 13:48 13:48:00 10/19/06 13:49 19.8873 2.65242 5.23488 13:49:00 19.7754 2.65166 5.12374 13:50:00 10/19/06 13:50 10/19/06 13:51 19.7449 2.6515 5.0934 13:51:00 19.7501 2.65221 5.09789 13:52:00 10/19/06 13:52 10/19/06 13:53 19.691 2.65272 5.03828 13:53:00 19.8338 2.65274 5.18106 13:54:00 10/19/06 13:54 10/19/06 13:55 19.8174 2.65405 5.16335 13:55:00 10/19/06 13:56 19.7443 2.65351 5.09079 13:56:00 10/19/06 13:57 19.8589 2.65271 5.20619 13:57:00 13:58:00 10/19/06 13:58 19.7603 2.652 5.1083 19.7771 2.65126 5.12584 13:59:00 10/19/06 13:59 10/19/06 14:00 19.8474 2.65224 5.19516 14:00:00 10/19/06 14:01 19.7798 2.65206 5.12774 14:01:00 10/19/06 14:02 19.8217 2.65101 5.17069 14:02:00 5.08447 19.735 2.65053 14:03:00 10/19/06 14:03 19.8154 2.65129 5.16411 14:04:00 10/19/06 14:04 19.8758 2.65231 5.22349 14:05:00 10/19/06 14:05 10/19/06 14:06 19.6766 2.65172 5.02488 14:06:00 2.65152 5.14878 14:07:00 10/19/06 14:07 19.8003 10/19/06 14:08 19.8496 2.65053 5.19907 14:08:00 19.7389 2.65075 5.08815 14:09:00 10/19/06 14:09 10/19/06 14:10 19.9173 2.64914 5.26816 14:10:00 10/19/06 14:11 19.8194 2.64965 5.16975 14:11:00 10/19/06 14:12 19.6978 2.65055 5.04725 14:12:00 10/19/06 14:13 19.8173 2.64998 5.16732 14:13:00 10/19/06 14:14 19.836 2.64859 5.18741 14:14:00 19.7869 2.64808 5.13882 14:15:00 10/19/06 14:15 10/19/06 14:16 19.7677 2.64802 5.11968 14:16:00 19.8114 2.64882 5.16258 14:17:00 10/19/06 14:17 19.7597 2.64763 5.11207 10/19/06 14:18 14:18:00 5.14196 10/19/06 14:19 19.7887 2.64674 14:19:00 19.8348 2.64717 5.18763 14:20:00 10/19/06 14:20 10/19/06 14:21 19.8786 2.64677 5.23183 14:21:00 5.2366 14:22:00 10/19/06 14:22 19.883 2.6464 2.64708 5.11262 14:23:00 10/19/06 14:23 19.7597 10/19/06 14:24 19.7824 2.646 5.1364 14:24:00 19.7803 2.64979 5.13051 14:25:00 10/19/06 14:25 10/19/06 14:26 19.8461 2.64555 5.20055 14:26:00

Water Level Recording Data

| ime | GPM | Time | SpCond | | Data _ | Baro | SWL | Time | GPM | DRWDN | Curv |
|-----|-----|------|--------|----------------|---------|---------|---------|----------|-----|-------|------|
| | | | | 10/19/06 14:27 | 19.8683 | 2.64681 | 5.22149 | 14:27:00 | | | |
| | | | | 10/19/06 14:28 | 19.7777 | 2.64498 | 5.13272 | 14:28:00 | | | |
| | | | | 10/19/06 14:29 | 19.7281 | 2.64463 | 5.08347 | 14:29:00 | | | |
| | | | | 10/19/06 14:30 | 19.7545 | 2.64648 | 5.10802 | 14:30:00 | | | |
| | | | | 10/19/06 14:31 | 19.8345 | 2.64651 | 5.18799 | 14:31:00 | | | |
| | | | | 10/19/06 14:32 | 19.9128 | 2.64499 | 5.26781 | 14:32:00 | | | |
| | | | | 10/19/06 14:33 | 19.8322 | 2.64368 | 5.18852 | 14:33:00 | | | |
| | | | | 10/19/06 14:34 | 19.7568 | 2.64486 | 5.11194 | 14:34:00 | | | |
| | | | | 10/19/06 14:35 | 19.7896 | 2.64629 | 5.14331 | 14:35:00 | | | |
| | | | | 10/19/06 14:36 | 19.7074 | 2.64676 | 5.06064 | 14:36:00 | | | |
| | | | | 10/19/06 14:37 | 19.8442 | 2.6454 | 5.1988 | 14:37:00 | | | |
| | | | | 10/19/06 14:38 | 19.6576 | 2.64611 | 5.01149 | 14:38:00 | | | |
| | | | | 10/19/06 14:39 | 19.7976 | 2.64632 | 5.15128 | 14:39:00 | | | |
| | | | | 10/19/06 14:40 | 19.7239 | 2.64569 | 5.07821 | 14:40:00 | | | |
| | | | | 10/19/06 14:41 | 19.811 | 2.64523 | 5.16577 | 14:41:00 | | | |
| | | | | 10/19/06 14:42 | 19.7684 | 2.6441 | 5.1243 | 14:42:00 | | | |
| | | | | 10/19/06 14:43 | 19.9197 | 2.6441 | 5.2756 | 14:43:00 | | | |
| | | | | 10/19/06 14:44 | 19.788 | 2.64341 | 5.14459 | 14:44:00 | | | |
| | | | | 10/19/06 14:45 | 19.764 | 2.64503 | 5.11897 | 14:45:00 | | | |
| | | | | 10/19/06 14:46 | 19.8147 | 2.64301 | 5.17169 | 14:46:00 | | | |
| | | | | 10/19/06 14:47 | 19.7672 | 2.64298 | 5.12422 | 14:47:00 | | | |
| | | | | 10/19/06 14:48 | 19.8092 | 2.64262 | 5.16658 | 14:48:00 | | | |
| | | | | 10/19/06 14:49 | 19.8122 | 2.64202 | 5.17018 | 14:49:00 | | | |
| | | | | 10/19/06 14:50 | 19.794 | 2.64188 | | | | | |
| | | | | 10/19/06 14:51 | 19.8208 | 2.64245 | | | | | |
| | | | | 10/19/06 14:52 | | 2.6446 | | | | | |
| | | | | 10/19/06 14:53 | 19.7543 | 2.64382 | 5.11048 | 14:53:00 | | | |
| | | | | 10/19/06 14:54 | 19.6856 | 2.6443 | | | | | |
| | | | | 10/19/06 14:55 | 19.7465 | 2.64427 | 5.10223 | 14:55:00 | | | |
| | | | | 10/19/06 14:56 | 19.7429 | 2.64392 | | | | | |
| | | | | 10/19/06 14:57 | 19.7844 | 2.64558 | | | | | |
| | | | | 10/19/06 14:58 | 19.859 | 2.64447 | | | | | |
| | | | | 10/19/06 14:59 | | 2.64503 | | | | | |
| | | | | 10/19/06 15:00 | | 2.64515 | | | | | |
| | | | | 10/19/06 15:01 | 19.8114 | 2.64444 | | | | | |
| | | | | 10/19/06 15:02 | | 2.64597 | | | | | |
| | | | | 10/19/06 15:03 | | 2.6445 | | | | | |
| | | | | 10/19/06 15:04 | 19.7528 | 2.64358 | | | | | |
| | | | | 10/19/06 15:05 | | 2.64404 | | | | | |
| | | | | 10/19/06 15:06 | | 2.64411 | 5.05329 | | | | |
| | | | | 10/19/06 15:07 | 19.7126 | 2.64423 | | | | | |
| | | | | 10/19/06 15:08 | | 2.64517 | | | | | |
| | | | | 10/19/06 15:09 | | 2.6449 | | 15:09:00 | | | |
| | | | | 10/19/06 15:10 | 19.7424 | 2.64481 | 5.09759 | | | | |
| | | | | 10/19/06 15:11 | 19.7789 | 2.6443 | | | | | |
| | | | | 10/19/06 15:12 | | 2.64469 | | | | | |
| | | | | 10/19/06 15:13 | | 2.64398 | | | | | |
| | | | | 10/19/06 15:14 | 19.7884 | 2.64568 | | | | | |
| | | | | 10/19/06 15:15 | | 2.64534 | | | | | |
| | | | | 10/10/00 10:10 | | | 0.00170 | | | | |

Water Level Recording Data

| Time | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curv |
|------|-----|------|--------|----------------------------------|--------------------|-------------------|-------------------|----------------------|-----|-------|------|
| | | | | 10/19/06 15:17 | 19.6929 | 2.64574 | 5.04716 | 15:17:00 | | | |
| | | | | 10/19/06 15:18 | 19.8486 | 2.64722 | 5.20138 | 15:18:00 | | | |
| | | | | 10/19/06 15:19 | 19.8477 | 2.64606 | 5.20164 | 15:19:00 | | | |
| | | | | 10/19/06 15:20 | 19.8453 | 2.64603 | 5.19927 | 15:20:00 | | | |
| | | | | 10/19/06 15:21 | 19.7849 | 2.64751 | 5.13739 | 15:21:00 | | | |
| | | | | 10/19/06 15:22 | 19.7722 | 2.64748 | 5.12472 | 15:22:00 | | | |
| | | | | 10/19/06 15:23 | 19.6937 | 2.64736 | 5.04634 | 15:23:00 | | | |
| | | | | 10/19/06 15:24 | 19.7577 | 2.64675 | 5.11095 | 15:24:00 | | | |
| | | | | 10/19/06 15:25 | 19.7489 | 2.64634 | 5.10256 | 15:25:00 | | | |
| | | | | 10/19/06 15:26 | 19.8205 | 2.64705 | 5.17345 | 15:26:00 | | | |
| | | | | 10/19/06 15:27 | 19.6464 | 2.64621 | 5.00019 | 15:27:00 | | | |
| | | | | 10/19/06 15:28 | 19.8444 | 2.64771 | 5.19669 | 15:28:00 | | | |
| | | | | 10/19/06 15:29 | 19.8436 | 2.64692 | 5.19668 | 15:29:00 | | | |
| | | | | 10/19/06 15:30 | 19.7632 | 2.64669 | 5.11651 | 15:30:00 | | | |
| | | | | 10/19/06 15:31 | 19.8552 | 2.64765 | 5.20755 | 15:31:00 | | • | |
| | | | | 10/19/06 15:32 | 19.8013 | 2.64823 | 5.15307 | 15:32:00 | | | |
| | | | | 10/19/06 15:33 | 19.7383 | 2.6464 | 5.0919 | 15:33:00 | | | |
| | | | | 10/19/06 15:34 | 19.8271 | 2.6468 | 5.1803 | 15:34:00 | | | |
| | | | | 10/19/06 15:35 | 19.9056 | 2.64545 | 5.26015 | 15:35:00 | | | |
| | | | | 10/19/06 15:36 | 19.7612 | 2.64438 | 5.11682 | 15:36:00 | | | |
| | | | | 10/19/06 15:37 | 19.7745 | 2.64419 | 5.13031 | 15:37:00 | | | |
| | | | | 10/19/06 15:38 | 19.754 | 2.64369 | 5.11031 | 15:38:00 | | | |
| | | | | 10/19/06 15:39 | 19.8452 | 2.64444 | 5.20076 | 15:39:00 | | | |
| | | | | 10/19/06 15:40 | 19.7379 | 2.64288 | 5.09502 | 15:40:00 | | | |
| | | | | 10/19/06 15:41 | 19.7779 | 2.64259 | 5.13531 | 15:41:00 | | | |
| | | | | 10/19/06 15:42 | 19.7894 | 2.64383 | 5.14557 | 15:42:00 | | | |
| | | | | 10/19/06 15:43 | 19.8293 | 2.6436 2.64441 | 5.1857 5.17769 | 15:43:00 15:44:00 | | | |
| | | | | 10/19/06 15:44 10/19/06 15:45 | 19.8221 19.7828 | 2.64471 | 5.17769 | 15:44:00 15:45:00 | | | |
| | | | | 10/19/06 15:46 | 19.7641 | 2.64406 | 5.12004 | 15:46:00 | | | |
| | | | | 10/19/06 15:47 | 19.845 | 2.6448 | 5.2002 | 15:47:00 | | | |
| | | | | 10/19/06 15:48 | 19.7498 | 2.64436 | 5.10544 | 15:48:00 | | | |
| | | | | 10/19/06 15:49 | 19.8091 | 2.64492 | 5.16418 | 15:49:00 | | | |
| | | | | 10/19/06 15:50 | 19.7754 | 2.64504 | 5.13036 | 15:50:00 | | | |
| | | | | 10/19/06 15:51 | 19.8105 | 2.6443 | 5.1662 | 15:51:00 | | | |
| | | | | 10/19/06 15:52 | 19.6983 | 2.64438 | 5.05392 | 15:52:00 | | | |
| | | | | 10/19/06 15:53 | 19.8832 | 2.64444 | 5.23876 | 15:53:00 | | | |
| | | | | 10/19/06 15:54 | 19.6784 | 2.64395 | 5.03445 | 15:54:00 | | | |
| | | | | 10/19/06 15:55 | 19.7209 | 2.64499 | 5.07591 | 15:55:00 | | | |
| | | | | 10/19/06 15:56 | 19.8906 | 2.64506 | 5.24554 | | | | |
| | | | | 10/19/06 15:57 | 19.7363 | 2.64507 | 5.09123 | 15:57:00 | | | |
| | | | | 10/19/06 15:58 | 19.8671 | 2.64557 | 5.22153 | 15:58:00 | | | |
| | | | | 10/19/06 15:59 | 19.7624 | 2.64506 | 5.11734 | 15:59:00 | | | |
| | | | | 10/19/06 16:00 | 19.8958 | 2.64683 | 5.24897 | 16:00:00 | | | |
| | | | | 10/19/06 16:01 | 19.8032 | 2.64481 | 5.15839 | 16:01:00 | | | |
| | | | | 10/19/06 16:02 | 19.8026 | 2.64457 | 5.15803 | 16:02:00 | | | |
| | | | | 10/19/06 16:03 | 19.7888 | 2.64461 | 5.14419 | 16:03:00 | | | |
| | | | | 10/19/06 16:04 | 19.7428 | 2.64515 | 5.09765 | 16:04:00 | | | |
| | | | | 10/19/06 16:05 | 19.7283 | 2.64501 | 5.08329 | 16:05:00 | | | |
| | | | | | | | | | | | |

Water Level Recording Data

| Time | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
|------|----------|-------|--------|----------------|---------|---------|---------|----------|-------|----------|--------|
| | <u> </u> | 18116 | оросна | | Data | במוט | JIIL | INIG | GF WI | DIVANDIA | _cuive |
| | | | | 10/19/06 16:07 | 19.8399 | 2.64467 | 5.19523 | 16:07:00 | | | |
| | | | | 10/19/06 16:08 | 19.6602 | 2.64507 | 5.01513 | 16:08:00 | | | |
| | | | | 10/19/06 16:09 | 19.7335 | 2.64441 | 5.08909 | 16:09:00 | | | |
| | | | | 10/19/06 16:10 | | | 5.13017 | 16:10:00 | | | |
| | | | | 10/19/06 16:11 | 19.7227 | 2.64487 | 5.07783 | 16:11:00 | | | |
| | | | | 10/19/06 16:12 | 19.7581 | 2.64531 | 5.11279 | 16:12:00 | | | |
| | | | | 10/19/06 16:13 | 19.8122 | 2.64514 | 5.16706 | 16:13:00 | | | |
| | | | | 10/19/06 16:14 | 19.8153 | 2.64531 | 5.16999 | 16:14:00 | | | |
| | | | | 10/19/06 16:1 | | | 5.16378 | 16:15:00 | | | |
| | | | | 10/19/06 16:16 | | | 5.09081 | 16:16:00 | | | |
| | | | | 10/19/06 16:17 | 19.8725 | | 5.22714 | 16:17:00 | | | |
| | | | | 10/19/06 16:18 | | | 5.15371 | 16:18:00 | | | |
| | | | | 10/19/06 16:19 | 19.6991 | 2.64477 | 5.05433 | 16:19:00 | | | |
| | | | | 10/19/06 16:20 | 19.861 | 2.64331 | 5.21769 | 16:20:00 | | | |
| | | | | 10/19/06 16:21 | 19.6931 | 2.64294 | 5.05016 | 16:21:00 | | | |
| | | | | 10/19/06 16:22 | 19.7723 | 2.64492 | 5.12738 | 16:22:00 | | | |
| | | | | 10/19/06 16:23 | 19.7411 | 2.64476 | 5.09634 | 16:23:00 | | | |
| | | | | 10/19/06 16:24 | 19.7521 | 2.64443 | 5.10767 | 16:24:00 | | | |
| | | | | 10/19/06 16:25 | 19.735 | 2.64495 | 5.09005 | 16:25:00 | | | |
| | | | | 10/19/06 16:26 | 19.7834 | 2.64449 | 5.13891 | 16:26:00 | | | |
| | | | | 10/19/06 16:27 | 19.7112 | 2.64549 | 5.06571 | 16:27:00 | | | |
| | | | | 10/19/06 16:28 | 19.7366 | 2.6451 | 5.0915 | 16:28:00 | | | |
| | | | | 10/19/06 16:29 | 19.7123 | 2.64669 | 5.06561 | 16:29:00 | | | |
| | | | | 10/19/06 16:30 | 19.7591 | 2.64498 | 5.11412 | | | | |
| | | | | 10/19/06 16:31 | 19.7447 | 2.64429 | 5.10041 | 16:31:00 | | | |
| | | | | 10/19/06 16:32 | 19.7323 | 2.64523 | 5.08707 | 16:32:00 | | | |
| | | | | 10/19/06 16:33 | 19.819 | 2.64499 | 5.17401 | 16:33:00 | | | |
| | | | | 10/19/06 16:34 | 19.6778 | 2.64499 | 5.03281 | 16:34:00 | | | |
| | | | | 10/19/06 16:3 | 19.804 | 2.64547 | 5.15853 | 16:35:00 | | | |
| | | | | 10/19/06 16:36 | | | 5.07979 | 16:36:00 | | | |
| | | | | 10/19/06 16:37 | | | 5.11626 | 16:37:00 | | | |
| | | | | 10/19/06 16:38 | | | 5.10774 | 16:38:00 | | | |
| | | | | 10/19/06 16:39 | | | 5.16777 | 16:39:00 | | | |
| | | | | 10/19/06 16:40 | | | 5.04986 | 16:40:00 | | | |
| | | | | 10/19/06 16:41 | | | 5.02481 | 16:41:00 | | | |
| | | | | 10/19/06 16:42 | | | 5.08648 | 16:42:00 | | | |
| | | | | 10/19/06 16:43 | | | 5.09177 | 16:43:00 | | | |
| | | | | 10/19/06 16:44 | | | 5.17372 | | | | |
| | | | | 10/19/06 16:45 | | | 5.11266 | 16:45:00 | | | |
| | | | | 10/19/06 16:46 | | 2.64857 | 4.96553 | 16:46:00 | | | |
| | | | | 10/19/06 16:47 | | | 5.14466 | 16:47:00 | | | |
| | | | | 10/19/06 16:48 | | | 5.04535 | 16:48:00 | | | |
| | | | | 10/19/06 16:49 | | | 5.12201 | 16:49:00 | | | |
| | | | | 10/19/06 16:50 | | | 5.09109 | 16:50:00 | | | |
| | | | | 10/19/06 16:51 | | 2.64803 | 5.08077 | 16:51:00 | | | |
| | | | | 10/19/06 16:52 | | | 5.21276 | 16:52:00 | | | |
| | | | | 10/19/06 16:53 | | | 5.05644 | 16:53:00 | | | |
| | | | | 10/19/06 16:54 | | | 5.11392 | 16:54:00 | | | |
| | | | | 10/19/06 16:55 | | | 5.03919 | 16:55:00 | | | |
| | | | | 10/19/06 16:56 | | 2.65155 | 5.04545 | 16:56:00 | | | |

Water Level Recording Data Step Test Performance Manually Collected Data SpCond Data Baro **SWL** Time **GPM** DRWDN Curve **GPM** Time Time 19.6328 2.65209 4.98071 16:57:00 10/19/06 16:57 5.08603 16:58:00 10/19/06 16:58 19.7376 2.65157 5.05657 16:59:00 10/19/06 16:59 19.7083 2.65173 19.6344 2.65178 4.98262 17:00:00 10/19/06 17:00 10/19/06 17:01 19.7068 2.65217 5.05463 17:01:00 2.65215 5.10405 17:02:00 10/19/06 17:02 19.7562 5.06844 17:03:00 19.7201 2.65166 10/19/06 17:03 10/19/06 17:04 19.6566 2.65143 5.00517 17:04:00 2.65131 5.07779 17:05:00 10/19/06 17:05 19.7291 10/19/06 17:06 19.7389 2.65175 5.08715 17:06:00 10/19/06 17:07 19.7706 2.65189 5.11871 17:07:00 2.65195 5.11635 17:08:00 19.7683 10/19/06 17:08 19.716 2.65283 5.06317 17:09:00 10/19/06 17:09 19.5887 2.65224 4.93646 17:10:00 10/19/06 17:10 10/19/06 17:11 19.6125 2.65309 4.95941 17:11:00 2.6534 4.9227 17:12:00 10/19/06 17:12 19.5761 10/19/06 17:13 19.6704 2.65307 5.01733 17:13:00 5.06078 17:14:00 19.7146 2.65382 10/19/06 17:14 10/19/06 17:15 19.6777 2.65346 5.02424 17:15:00 10/19/06 17:16 19.665 2.65487 5.01013 17:16:00 10/19/06 17:17 19.7746 2.65485 5.11975 17:17:00 2.65526 4.98724 17:18:00 10/19/06 17:18 19.6425 19.624 2.65609 4.96791 17:19:00 10/19/06 17:19 10/19/06 17:20 19.6826 2.65559 5.02701 17:20:00 2.65616 4.96854 17:21:00 10/19/06 17:21 19.6247 10/19/06 17:22 19.5477 2.65703 4.89067 17:22:00 19.7089 2.6584 5.0505 17:23:00 10/19/06 17:23 19.6645 2.65875 5.00575 17:24:00 10/19/06 17:24 10/19/06 17:25 19.6002 2.65898 4.94122 17:25:00 10/19/06 17:26 19.6604 2.65971 5.00069 17:26:00 2.66006 4.92954 17:27:00 10/19/06 17:27 19.5896 10/19/06 17:28 19.5467 2.66034 4.88636 17:28:00 19.6172 2.66082 4.95638 17:29:00 10/19/06 17:29 10/19/06 17:30 19.6185 2.66128 4.95722 17:30:00 10/19/06 17:31 19.5545 2.66147 4.89303 17:31:00 10/19/06 17:32 19.5588 2.66221 4.89659 17:32:00 17:33:00 10/19/06 17:33 19.6786 2.66292 5.01568 10/19/06 17:34 19.6498 2.66289 4.98691 17:34:00 10/19/06 17:35 19.6633 2.66379 4.99951 17:35:00 10/19/06 17:36 19.5051 2.66433 4.84077 17:36:00 19.6218 2.66446 4.95734 17:37:00 10/19/06 17:37 2.66474 4.94256 17:38:00 10/19/06 17:38 19.6073 2.66525 5.08805 17:39:00 10/19/06 17:39 19.7533 19.5597 2.66633 4.89337 17:40:00 10/19/06 17:40 10/19/06 17:41 19.5344 2.66685 4.86755 17:41:00 4.90998 10/19/06 17:42 19.5767 2.66672 17:42:00 4.86849 17:43:00 10/19/06 17:43 19.5362 2.66771 10/19/06 17:44 19.6702 2.66744 5.00276 17:44:00 19.5661 2.66765 4.89845 17:45:00 10/19/06 17:45

10/19/06 17:46

19.6482

2.66793

4.98027 17:46:00

| Manually | y Collected | Data | | Water Level Re | ecording Dat | Step Test Performance | | | | | |
|----------|-------------|------|--------|----------------|--------------|-----------------------|---------|----------|-----|-------|-------|
| Time | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
| | | | | 10/19/06 17:4 | 7 19.6681 | 2.6687 | 4.9994 | 17:47:00 | | | |
| | | | | 10/19/06 17:48 | | | | | | | |
| | | | | 10/19/06 17:49 | | | | | | | |
| | | | | 10/19/06 17:50 | | | | | | | |
| | | | | 10/19/06 17:5 | | | 5.0255 | | | | |
| | | | | 10/19/06 17:5 | | | | | | | |
| | | | | 10/19/06 17:5 | | | 4.92893 | | | | |
| | | | | 10/19/06 17:5 | | | 4.85279 | | | | |
| | | | | 10/19/06 17:5 | | | | | | | |
| | | | | 10/19/06 17:50 | | | | | | | |
| | | | | 10/19/06 17:5 | | | | | | | |
| | | | | 10/19/06 17:58 | | | | | | | |
| | | | | 10/19/06 17:5 | | | | | | | |
| | | | | 10/19/06 18:0 | | | | | | | |
| | | | | 10/19/06 18:0 | | | 4.96963 | | | | |
| | | | | 10/19/06 18:0 | | | 4.85539 | | | | |
| | | | | 10/19/06 18:0 | | | | | | | |
| | | | | 10/19/06 18:0 | | | | | | | |
| | | | | 10/19/06 18:0 | | | | | | | |
| | | | | 10/19/06 18:0 | | | | | | | |
| | | | | | | | | | | | |
| | | | | 10/19/06 18:0 | | | | | | | |
| | | | | 10/19/06 18:0 | | | | | | | |
| | | | | 10/19/06 18:0 | | | | | | | |
| | | | | 10/19/06 18:10 | | | | | | | |
| | | | | 10/19/06 18:1 | | | | | | | |
| | | | | 10/19/06 18:1: | | | 4.92429 | | | | |
| | | | | 10/19/06 18:1 | | | | | | | |
| | | | | 10/19/06 18:14 | | | 4.92129 | | | | |
| | | | | 10/19/06 18:1: | | | | | | | |
| | | | | 10/19/06 18:1 | | | | | | | |
| | | | | 10/19/06 18:1 | | | | | | | |
| | | | | 10/19/06 18:1 | | | | | | | |
| | | | | 10/19/06 18:1 | | | | | | | |
| | | | | 10/19/06 18:2 | | | | | | | |
| | | | | 10/19/06 18:2 | | | | | | | |
| | | | | 10/19/06 18:2: | 2 19.5785 | 2.67967 | 4.89883 | 18:22:00 | | | |
| | | | | 10/19/06 18:2 | 3 19.5703 | 2.67894 | 4.89136 | 18:23:00 | | | |
| | | | | 10/19/06 18:24 | 4 19.5281 | 2.67891 | 4.84919 | 18:24:00 | | | |
| | | | | 10/19/06 18:2 | 5 19.6265 | 2.67878 | 4.94772 | 18:25:00 | | | |
| | | | | 10/19/06 18:2 | 6 19.5973 | 2.67914 | 4.91816 | 18:26:00 | | | |
| | | | | 10/19/06 18:2 | | 2.67965 | 4.80895 | 18:27:00 | | | |
| | | | | 10/19/06 18:2 | 8 19.4745 | 2.68056 | 4.79394 | 18:28:00 | | | |
| | | | | 10/19/06 18:2 | | | | | | | |
| | | | | 10/19/06 18:3 | | | | | | | |
| | | | | 10/19/06 18:3 | | | 4.78209 | | | | |
| | | | | 10/19/06 18:3 | | | 4.80249 | | | | |
| | | | | 10/19/06 18:3 | | | | | | | |
| | | | | 10/19/06 18:3 | | | | | | | |
| | | | | 10/19/06 18:3 | | | | | | | |
| | | | | | | | | | | | |

| Manuall | Manually Collected Data | | | | cording Dat | Step Tes | Step Test Performance | | | | |
|---------|-------------------------|------|--------|----------------|-------------|----------|-----------------------|----------|-----|-------|-------|
| Time | GPM | Time | SpCond | <u> </u> | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
| | | | | 10/19/06 18:37 | 7 19.4571 | 2.68501 | 4.77209 | 18:37:00 | | | |
| | | | | 10/19/06 18:38 | | 2.68546 | 4.78424 | 18:38:00 | | | |
| | | | | 10/19/06 18:39 | | | 4.9734 | 18:39:00 | | | |
| | | | | 10/19/06 18:40 | 19.4386 | 2.68642 | 4.75218 | 18:40:00 | | | |
| | | | | 10/19/06 18:4 | 19.5491 | 2.68685 | 4.86225 | 18:41:00 | | | |
| | | | | 10/19/06 18:42 | 2 19.4526 | 2.68811 | 4.76449 | 18:42:00 | | | |
| | | | | 10/19/06 18:43 | 3 19.6108 | 2.68828 | 4.92252 | 18:43:00 | | | |
| | | | | 10/19/06 18:44 | 19.6545 | 2.68878 | 4.96572 | 18:44:00 | | | |
| | | | | 10/19/06 18:45 | 5 19.4894 | 2.68906 | 4.80034 | 18:45:00 | | | |
| | | | | 10/19/06 18:46 | 19.562 | 2.68958 | 4.87242 | 18:46:00 | | | |
| | | | | 10/19/06 18:47 | 7 19.4522 | 2.68989 | 4.76231 | 18:47:00 | | | |
| | | | | 10/19/06 18:48 | 3 19.5463 | 2.69049 | 4.85581 | 18:48:00 | | | |
| | | | | 10/19/06 18:49 | 9 19.4347 | 2.69092 | 4.74378 | 18:49:00 | | | |
| | | | | 10/19/06 18:50 | 19.407 | 2.69121 | 4.71579 | 18:50:00 | | | |
| | | | | 10/19/06 18:51 | 19.5959 | 2.69141 | 4.90449 | 18:51:00 | | | |
| | | | | 10/19/06 18:52 | 2 19.4181 | 2.69235 | 4.72575 | 18:52:00 | | | |
| | | | | 10/19/06 18:53 | 3 19.4993 | | 4.80671 | 18:53:00 | | | |
| | | | | 10/19/06 18:54 | 19.3386 | 2.69231 | 4.64629 | 18:54:00 | | | |
| | | | | 10/19/06 18:5 | 5 19.3881 | 2.69271 | 4.69539 | 18:55:00 | | | |
| | | | | 10/19/06 18:56 | 19.479 | | 4.78541 | 18:56:00 | | | |
| | | | | 10/19/06 18:57 | 7 19.5506 | 2.69349 | 4.85711 | 18:57:00 | | | |
| | | | | 10/19/06 18:58 | | | | 18:58:00 | | | |
| | | | | 10/19/06 18:59 | 19.4496 | 2.69441 | 4.75519 | 18:59:00 | | | |
| | | | | 10/19/06 19:00 | 19.5138 | | 4.81958 | 19:00:00 | | | |
| | | | | 10/19/06 19:01 | l 19.5018 | | 4.80669 | 19:01:00 | | | |
| | | | | 10/19/06 19:02 | | 2.6949 | 4.6929 | 19:02:00 | | | |
| | | | | 10/19/06 19:03 | | | 4.78688 | 19:03:00 | | | |
| | | | | 10/19/06 19:04 | | | 4.85541 | 19:04:00 | | | |
| | | | | 10/19/06 19:0 | | 2.69669 | 4.87601 | 19:05:00 | | | |
| | | | | 10/19/06 19:06 | | | 4.77443 | 19:06:00 | | | |
| | | | | 10/19/06 19:07 | | | 4.70382 | | | | |
| _ | | | | 10/19/06 19:08 | | | 4.73569 | 19:08:00 | | | |
| 0 | | | | 10/19/06 19:09 | | 2.69828 | | | | | |
| | | | | 10/19/06 19:10 | | 2.6992 | 4.7529 | 19:10:00 | | | |
| | | | | 10/19/06 19:11 | | | 4.84841 | 19:11:00 | | | |
| | | | | 10/19/06 19:12 | | 2.69926 | 4.76984 | 19:12:00 | | | |
| | | | | 10/19/06 19:13 | | 2.69991 | 4.89449 | 19:13:00 | | | |
| | | | | 10/19/06 19:14 | | 2.69926 | 4.90484 | | | | |
| | | | | 10/19/06 19:19 | | 2.69988 | 4.82922 | 19:15:00 | | | |
| | | | | 10/19/06 19:16 | | 2.69982 | 4.81028 | 19:16:00 | | | |
| | | | | 10/19/06 19:17 | | | 4.71329 | 19:17:00 | | | |
| | | | | 10/19/06 19:18 | | | 4.65546 | 19:18:00 | | | |
| | | | | 10/19/06 19:19 | | | 4.86092 | | | | |
| | | | | 10/19/06 19:20 | | 2.70076 | 4.83694 | | | | |
| | | | | 10/19/06 19:21 | | | 4.62787 | | | | |
| | | | | 10/19/06 19:22 | | | 4.80524 | 19:22:00 | | | |
| | | | | 10/19/06 19:23 | | 2.70186 | 4.94514 | | | | |
| | | | | 10/19/06 19:24 | | 2.70198 | 4.72482 | | | | |
| | | | | 10/19/06 19:25 | | 2.7025 | 4.6349 | 19:25:00 | | | |
| | | | | 10/19/06 19:26 | 19.3975 | 2.70246 | 4.69504 | 19:26:00 | | | |

| | | | | | cording Dat | - | | | - 10p | st Performar | |
|------|-----|------|--------|----------------|-------------|---------|---------|----------|-------|--------------|-------|
| Time | GPM | Time | SpCond | · | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
| | | | | 10/19/06 19:27 | 19.5369 | 2.70258 | 4.83432 | 19:27:00 | | | |
| | | | | 10/19/06 19:28 | | | 4.77488 | | | | |
| | | | | 10/19/06 19:29 | | | 4.80574 | | | | |
| | | | | 10/19/06 19:30 | 19.3684 | 2.70258 | 4.66582 | 19:30:00 | | | |
| | | | | 10/19/06 19:31 | 19.3833 | 2.70315 | 4.68015 | | | | |
| | | | | 10/19/06 19:32 | 19.3947 | 2.70263 | 4.69207 | 19:32:00 | • | | |
| | | | | 10/19/06 19:33 | 19.4964 | 2.70304 | 4.79336 | 19:33:00 | | | |
| | | | | 10/19/06 19:34 | 19.3759 | 2.70415 | 4.67175 | 19:34:00 | | | |
| | | | | 10/19/06 19:35 | 19.5397 | 2.70491 | 4.83479 | 19:35:00 | | | |
| | | | | 10/19/06 19:36 | | 2.70505 | 4.64215 | 19:36:00 | | | |
| | | | | 10/19/06 19:37 | 19.4703 | 2.70591 | 4.76439 | 19:37:00 | | | |
| | | | | 10/19/06 19:38 | 19.5275 | 2.7063 | 4.8212 | 19:38:00 | | | |
| | | | | 10/19/06 19:39 | 19.4434 | 2.70659 | 4.73681 | 19:39:00 | | | |
| | | | | 10/19/06 19:40 | 19.4922 | 2.70733 | 4.78487 | 19:40:00 | | | |
| | | | | 10/19/06 19:41 | 19.5016 | 2.70733 | 4.79427 | 19:41:00 | | | |
| | | | | 10/19/06 19:42 | 19.5199 | 2.70793 | 4.81197 | 19:42:00 | | | |
| | | | | 10/19/06 19:43 | 19.4583 | 2.70822 | 4.75008 | 19:43:00 | | | |
| | | | | 10/19/06 19:44 | 19.5925 | 2.70868 | 4.88382 | 19:44:00 | | | |
| | | | | 10/19/06 19:45 | 19.3801 | 2.70852 | 4.67158 | | | | |
| | | | | 10/19/06 19:46 | 19.4141 | 2.70838 | 4.70572 | 19:46:00 | | | |
| | | | | 10/19/06 19:47 | 19.5085 | 2.70902 | 4.79948 | 19:47:00 | | | |
| | | | | 10/19/06 19:48 | 19.4318 | | 4.7233 | | | | |
| | | | | 10/19/06 19:49 | 19.4823 | | 4.7734 | | | | |
| | | | | 10/19/06 19:50 | 19.4974 | 2.70903 | 4.78837 | 19:50:00 | | | |
| | | | | 10/19/06 19:51 | | | 4.79667 | | | | |
| | | | | 10/19/06 19:52 | 19.5287 | 2.70902 | 4.81968 | 19:52:00 | | | |
| | | | | 10/19/06 19:53 | 19.2646 | 2.70946 | 4.55514 | 19:53:00 | | | |
| | | | | 10/19/06 19:54 | | | 4.62081 | 19:54:00 | | | |
| | | | | 10/19/06 19:55 | | 2.71038 | 4.72772 | | | | |
| | | | | 10/19/06 19:56 | | | 4.73022 | | | | |
| | | | | 10/19/06 19:57 | | | 4.7965 | | | | |
| | | | | 10/19/06 19:58 | | | 4.7038 | | | | |
| | | | | 10/19/06 19:59 | | | 4.61199 | | | | |
| | | | | 10/19/06 20:00 | | | 4.65502 | | | | |
| | | | | 10/19/06 20:01 | | | 4.75164 | | | | |
| | | | | 10/19/06 20:02 | | | 4.79309 | | | | |
| | | | | 10/19/06 20:03 | | | 4.82025 | | | | |
| | | | | 10/19/06 20:04 | | | 4.692 | | | | |
| | | | | 10/19/06 20:05 | | | 4.74714 | | | | |
| | | | | 10/19/06 20:06 | | | 4.65553 | | | | |
| | | | | 10/19/06 20:07 | | | 4.65568 | | | | |
| | | | | 10/19/06 20:08 | | | 4.59908 | | | | |
| | | | | 10/19/06 20:09 | | | 4.73692 | | | | |
| | | | | 10/19/06 20:10 | | | 4.67876 | | | | |
| | | | | 10/19/06 20:11 | | | 4.78242 | | | | |
| | | | | 10/19/06 20:12 | | | 4.61163 | | | | |
| | | | | 10/19/06 20:13 | | | 4.64123 | | | | |
| | | | | 10/19/06 20:14 | | | 4.74833 | | | | |
| | | | | 10/19/06 20:15 | | | 4.64838 | | | | |
| | | | | 10/19/06 20:16 | 19.4233 | 2.71664 | 4.70666 | 20:16:00 | | | |

| Time | Manuall | y Collected | Data | | Water Level Re | cording Dat | а | | | Step Te | est Performa | nce |
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| 101/91/06 201-9 19.3086 2.71774 4.89086 2018-00 101/91/06 201-9 19.408 2.71837 4.86663 2029-00 101/91/06 201-9 19.408 2.71837 4.86663 2029-00 101/91/06 201-9 19.4081 2.71832 4.86678 2022-00 101/91/06 201-9 19.3081 2.71832 4.86678 2022-00 101/91/06 201-9 19.3081 2.71832 4.86678 2022-00 101/91/06 201-9 19.3081 2.7183 4.8163 2023-00 101/91/06 201-9 19.3081 2.7188 4.8163 2023-00 101/91/06 201-9 19.3081 2.7188 4.8163 2023-00 101/91/06 201-9 19.3082 2.71973 4.66387 2025-00 101/91/06 201-9 19.3082 2.71973 4.66387 2025-00 101/91/06 201-9 19.3082 2.71973 4.66387 2025-00 101/91/06 201-9 19.3582 2.71966 4.81374 2025-00 101/91/06 201-9 19.5076 2.72019 4.87812 2025-00 101/91/06 201-9 19.5076 2.72019 4.87812 2025-00 101/91/06 201-9 19.5076 2.72019 4.87812 2025-00 101/91/06 201-9 19.5076 2.72019 4.87812 2025-00 101/91/06 201-9 19.5076 2.72019 4.87714 20.3000 101/91/06 201-9 19.5076 2.72019 4.87014 4.8359 2.025-00 101/91/06 201-9 19.5076 2.72019 4.87014 20.3000 101/91/06 201-9 19.4084 2.72065 4.74396 20.3200 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3000 20.3 | Time | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM_ | DRWDN | Curve |
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| 10/19/06 20:51 | | | | | | | | | | | | |
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| 10/19/06 20:53 19.2452 2.72514 4.52006 20:53:00 10/19/06 20:54 19.4431 2.72446 4.71864 20:54:00 10/19/06 20:55 19.2682 2.72417 4.54403 20:55:00 10/19/06 20:56 19.4406 2.72485 4.71575 20:56:00 10/19/06 20:57 19.3756 2.72523 4.65037 20:57:00 10/19/06 20:58 19.3159 2.72561 4.59029 20:58:00 10/19/06 20:59 19.419 2.72576 4.69324 20:59:00 10/19/06 21:00 19.4219 2.72667 4.69363 21:00:00 10/19/06 21:01 19.3492 2.72664 4.62256 21:01:00 10/19/06 21:02 19.4412 2.72674 4.71446 21:02:00 10/19/06 21:03 19.4287 2.72693 4.70177 21:03:00 10/19/06 21:04 19.2719 2.72644 4.54546 21:04:00 | | | | | | | | | | | | |
| 10/19/06 20:54 19.4431 2.72446 4.71864 20:54:00 10/19/06 20:55 19.2682 2.72417 4.54403 20:55:00 10/19/06 20:56 19.4406 2.72485 4.71575 20:56:00 10/19/06 20:57 19.3756 2.72523 4.65037 20:57:00 10/19/06 20:58 19.3159 2.72561 4.59029 20:58:00 10/19/06 20:59 19.419 2.72576 4.69324 20:59:00 10/19/06 21:00 19.4219 2.72627 4.69563 21:00:00 10/19/06 21:01 19.3492 2.72664 4.62256 21:01:00 10/19/06 21:02 19.4412 2.72674 4.71446 21:02:00 10/19/06 21:03 19.4287 2.72693 4.70177 21:03:00 10/19/06 21:04 19.2719 2.72644 4.54546 21:04:00 | | | | | | | | | | | | |
| 10/19/06 20:55 19.2682 2.72417 4.54403 20:55:00 10/19/06 20:56 19.4406 2.72485 4.71575 20:56:00 10/19/06 20:57 19.3756 2.72523 4.65037 20:57:00 10/19/06 20:58 19.3159 2.72561 4.59029 20:58:00 10/19/06 20:59 19.419 2.72576 4.69324 20:59:00 10/19/06 21:00 19.4219 2.72627 4.69563 21:00:00 10/19/06 21:01 19.3492 2.72664 4.62256 21:01:00 10/19/06 21:02 19.4412 2.72674 4.71446 21:02:00 10/19/06 21:03 19.4287 2.72693 4.70177 21:03:00 10/19/06 21:04 19.2719 2.72644 4.54546 21:04:00 | | | | | | | | | | | | |
| 10/19/06 20:56 19.4406 2.72485 4.71575 20:56:00 10/19/06 20:57 19.3756 2.72523 4.65037 20:57:00 10/19/06 20:58 19.3159 2.72561 4.59029 20:58:00 10/19/06 20:59 19.419 2.72576 4.69324 20:59:00 10/19/06 21:00 19.4219 2.72627 4.69563 21:00:00 10/19/06 21:01 19.3492 2.72664 4.62256 21:01:00 10/19/06 21:02 19.4412 2.72674 4.71446 21:02:00 10/19/06 21:03 19.4287 2.72693 4.70177 21:03:00 10/19/06 21:04 19.2719 2.72644 4.54546 21:04:00 | | | | | | | | | | | | |
| 10/19/06 20:57 | | | | | | | | | | | | |
| 10/19/06 20:58 19.3159 2.72561 4.59029 20:58:00 10/19/06 20:59 19.419 2.72576 4.69324 20:59:00 10/19/06 21:00 19.4219 2.72627 4.69563 21:00:00 10/19/06 21:01 19.3492 2.72664 4.62256 21:01:00 10/19/06 21:02 19.4412 2.72674 4.71446 21:02:00 10/19/06 21:03 19.4287 2.72693 4.70177 21:03:00 10/19/06 21:04 19.2719 2.72644 4.54546 21:04:00 | | | | | | | | | | | | |
| 10/19/06 20:59 | | | | | | | | | | | | |
| 10/19/06 21:00 19.4219 2.72627 4.69563 21:00:00 10/19/06 21:01 19.3492 2.72664 4.62256 21:01:00 10/19/06 21:02 19.4412 2.72674 4.71446 21:02:00 10/19/06 21:03 19.4287 2.72693 4.70177 21:03:00 10/19/06 21:04 19.2719 2.72644 4.54546 21:04:00 | | | | | | | | | | | | |
| 10/19/06 21:01 19.3492 2.72664 4.62256 21:01:00 10/19/06 21:02 19.4412 2.72674 4.71446 21:02:00 10/19/06 21:03 19.4287 2.72693 4.70177 21:03:00 10/19/06 21:04 19.2719 2.72644 4.54546 21:04:00 | | | | | | | | | | | | |
| 10/19/06 21:02 19.4412 2.72674 4.71446 21:02:00 10/19/06 21:03 19.4287 2.72693 4.70177 21:03:00 10/19/06 21:04 19.2719 2.72644 4.54546 21:04:00 | | | | | | | | | | | | |
| 10/19/06 21:03 | | | | | | | | | | | | |
| 10/19/06 21:04 19.2719 2.72644 4.54546 21:04:00 | | | | | | | | | | | | |
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| 10110100 - 110100 - 110100 - 1101000 - 11010000 | | | | | | | | | | | | |
| 10/19/06 21:06 19.356 2.7276 4.6284 21:06:00 | | | | | | | | | | | | |

4.66797 21:56:00

Manually Collected Data Water Level Recording Data Step Test Performance Time **GPM** Time SpCond Data Baro SWL Time **GPM** DRWDN Curve 10/19/06 21:07 19.5156 2.72795 4.78765 21:07:00 10/19/06 21:08 19.3999 2.72808 4.67182 21:08:00 10/19/06 21:09 19.4138 2.72852 4.68528 21:09:00 2.72913 10/19/06 21:10 19.3767 4.64757 21:10:00 19.4325 2.72921 4.70329 21:11:00 10/19/06 21:11 10/19/06 21:12 19.3322 2.72954 4.60266 21:12:00 10/19/06 21:13 19.4922 2.72991 4.76229 21:13:00 10/19/06 21:14 19.407 2.73049 4.67651 21:14:00 19.4016 2.72993 4.67167 21:15:00 10/19/06 21:15 10/19/06 21:16 19.3805 2.73069 4.64981 21:16:00 19.3095 2.73117 10/19/06 21:17 4.57833 21:17:00 10/19/06 21:18 19.4261 2.73117 4.69493 21:18:00 10/19/06 21:19 19.266 2.73157 4.53443 21:19:00 10/19/06 21:20 19.3392 2.73138 4.60782 21:20:00 10/19/06 21:21 19.389 2.73143 4.65757 21:21:00 19.3648 2.731 4.6338 21:22:00 10/19/06 21:22 10/19/06 21:23 19.3638 2.73099 4.63281 21:23:00 2.73099 10/19/06 21:24 19.2499 4.51891 21:24:00 10/19/06 21:25 19.4981 2.73086 4.76724 21:25:00 19.2045 10/19/06 21:26 2.73069 4.47381 21:26:00 4.52456 21:27:00 10/19/06 21:27 19.2555 2.73094 10/19/06 21:28 19.4303 2.73085 4.69945 21:28:00 10/19/06 21:29 19.3714 2.73066 4.64074 21:29:00 19.2685 2.73125 4.53725 21:30:00 10/19/06 21:30 10/19/06 21:31 19.4564 2.73136 4.72504 21:31:00 10/19/06 21:32 19.4759 2.73177 4.74413 21:32:00 10/19/06 21:33 19.3743 2.73211 4.64219 21:33:00 10/19/06 21:34 19.4059 2.73287 4.67303 21:34:00 10/19/06 21:35 19.2852 2.7336 4.5516 21:35:00 10/19/06 21:36 19.4729 2.73421 4.73869 21:36:00 10/19/06 21:37 19.4334 2.73418 4.69922 21:37:00 10/19/06 21:38 19.3016 2.735 4.5666 21:38:00 10/19/06 21:39 19.3302 2.73416 4.59604 21:39:00 10/19/06 21:40 19.3896 2.73424 4.65536 21:40:00 10/19/06 21:41 19.3883 2.7349 4.6534 21:41:00 19.3028 2.73529 10/19/06 21:42 4.56751 21:42:00 10/19/06 21:43 19.3938 2.73509 4.65871 21:43:00 10/19/06 21:44 19.4532 2.73524 4.71796 21:44:00 10/19/06 21:45 19.242 2.73561 4.50639 21:45:00 10/19/06 21:46 19.373 2.73517 4.63783 21:46:00 19.2564 2.73558 10/19/06 21:47 4.52082 21:47:00 10/19/06 21:48 19.1545 2.73544 4.41906 21:48:00 10/19/06 21:49 19.2993 2.73424 4.56506 21:49:00 10/19/06 21:50 19.4542 2.73492 4.71928 21:50:00 10/19/06 21:51 19.3263 2.73452 4.59178 21:51:00 2.73512 10/19/06 21:52 19.1222 4.38708 21:52:00 10/19/06 21:53 19.3408 2.73492 4.60588 21:53:00 10/19/06 21:54 19.3752 2.73477 4.64043 21:54:00 10/19/06 21:55 19.3579 2.73444 4.62346 21:55:00 10/19/06 21:56 19.4027 2.73473

| Manuall | y Collected | Data | | Water Level Re | cording Dat | а | | | Step Tes | t Performar | ice |
|---------|-------------|------|--------|----------------|-------------------------------------------------|---------|----------|-----------------------------------------|------------------|-------------|------------|
| Time | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
| | | | | 10/19/06 21:57 | 19.2967 | 2.7349 | 4.5618 | 21:57:00 | | | |
| | | | | 10/19/06 21:58 | | | | 21:58:00 | | | |
| | | | | 10/19/06 21:59 | | | | 21:59:00 | | | |
| | | | | 10/19/06 22:00 | | | 4.55755 | 22:00:00 | | | |
| | | | | 10/19/06 22:01 | | | | | | | |
| | | | | 10/19/06 22:02 | | 2.73575 | | | Total duration C | R pumping | , 10 hours |
| | | | | 10/19/06 22:03 | | | | | Begin recovery, | | _ |
| | | | | 10/19/06 22:04 | 27.6068 | 2.73542 | 12.87138 | 22:04:00 | | | |
| | | | | 10/19/06 22:05 | | | 12.77869 | 22:05:00 | | | |
| | | | | 10/19/06 22:06 | 27.5574 | 2.73452 | 12.82288 | 22:06:00 | | | |
| _ | | | | 10/19/06 22:07 | 27.5681 | 2.7347 | 12.8334 | 22:07:00 | | | |
| | | | | 10/19/06 22:08 | 27.5803 | | 12.84557 | | | | |
| | | | | 10/19/06 22:08 | 27.5894 | 2.73427 | 12.85513 | 22:09:00 | | | |
| | | | | 10/19/06 22:10 | 27.5972 | | 12.86325 | | | | |
| | | | | 10/19/06 22:11 | 27.6048 | 2.73367 | 12.87113 | 22:11:00 | | | |
| | | | | 10/19/06 22:12 | 27.6107 | 2.73353 | 12.87717 | 22:12:00 | | | |
| | | | | 10/19/06 22:13 | 27.6161 | | 12.88243 | | | | |
| | | | | 10/19/06 22:14 | 27.6209 | | 12.88735 | | | | |
| | | | | 10/19/06 22:18 | 27.6255 | 2.73332 | 12.89218 | 22:15:00 | | | |
| | | | | 10/19/06 22:16 | | | 12.89548 | 22:16:00 | | | |
| | | | | 10/19/06 22:17 | 27,633 | 2.73388 | 12.89912 | 22:17:00 | | | |
| | | | | 10/19/06 22:18 | 27.6368 | 2.73385 | 12.90295 | 22:18:00 | | | |
| | | | | 10/19/06 22:19 | 27.6405 | 2.73398 | 12.90652 | 22:19:00 | | | |
| | | | | 10/19/06 22:20 | 27.6436 | 2.73429 | 12.90931 | 22:20:00 | | | |
| | | | | 10/19/06 22:21 | 27,647 | 2.7343 | 12.9127 | 22:21:00 | | | |
| | | | | 10/19/06 22:22 | 27.6495 | 2.73404 | 12.91546 | 22:22:00 | | | |
| | | | | 10/19/06 22:23 | 27.6536 | | | 22:23:00 | | | |
| | | | | 10/19/06 22:24 | 27.6559 | | 12.92265 | | | | |
| | | | | 10/19/06 22:25 | 27.6583 | | 12.92508 | 22:25:00 | | | |
| | | | | 10/19/06 22:26 | 27.6608 | 2.73273 | 12.92807 | 22:26:00 | | | |
| | | | | 10/19/06 22:27 | 27.6629 | 2.73291 | 12.92999 | 22:27:00 | | | |
| | | | | 10/19/06 22:26 | 27.6672 | 2.73249 | 12.93471 | 22:28:00 | | | |
| A . | | | | 10/19/06 22:29 | 27.6691 | 2.73272 | 12.93638 | 22:29:00 | | | |
| V | | | | 10/19/06 22:30 | 27.6727 | 2.73219 | 12.94051 | 22:30:00 | | | |
| | | | | 10/19/06 22:31 | | | 12.94261 | 22:31:00 | | | |
| | | | | 10/19/06 22:32 | | 12 | 12.94502 | | | | |
| | | | | 10/19/06 22:3 | 27.6791 | | 12.94728 | . 1 S. 1 11 46 70 74 C-1941 | | | |
| | | | | 10/19/06 22:34 | | | 12.94911 | 22:34:00 | | | |
| | | | | 10/19/06 22:35 | | | 12.95161 | . 1.1 | | | |
| | | | | 10/19/06 22:36 | 27.685 5 | | 12.95413 | 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 | | | |
| | | | | 10/19/06 22:37 | | | 12.95551 | | | | |
| | | | | 10/19/06 22:38 | | | 12.95867 | | | | |
| | | | | 10/19/06 22:39 | | | 12.96057 | | | | |
| | | | | 10/19/08:22:40 | | | 12.96318 | | | | |
| | | | | 10/19/06 22:41 | | | | | | | |
| | | | | 10/19/06 22:42 | | | | 上文學的機能等所以 | | | |
| | | | | 10/19/06 22:43 | | | | 22:43:00 | | | |
| | | | | 10/19/06 22:44 | 27.7025 | | | | | | |
| | | | | 10/19/06 22:45 | 16.27 C 16. 16. 16. 16. 16. 16. 16. 16. 16. 16. | | 12.97325 | | | | |
| | | | | 10/19/06 22:46 | 27.7074 | 2.73221 | 12.97519 | 22:46:00 | | | |
| | | | | | | | | | | | |

Manually Collected Data Water Level Recording Data Step Test Performance Time **GPM** Time SpCond Data Baro SWL Time **GPM** DRWDN Curve 10/19/06 22:47 27.7082 2.7316 12.9766 22:47:00 10/19/06 22:48 27.7108 2.73111 12.97969 22:48:00 10/19/06 22:49 27.7124 2.73018 12.98222 22:49:00 2.73011 12.98399 10/19/06 22:50 27.7141 22:50:00 10/19/06 22:51 27.7159 2,72988 12,98602 22:51:00 10/19/06 22:52 27.7187 2.72998 12.98872 22:52:00 10/19/06 22:53 27.7203 2.72975 12.99055 22:53:00 10/19/06 22:54 27.7224 2.72958 12.99282 22:54:00 10/19/06 22:55 2.7293 12.9947 27.724 22:55:00 10/19/06 22:56 27,7266 2.72951 12.99709 22:56:00 10/19/06 22:57 27,7294 2.72896 13,00044 22:57:00 10/19/06 22:58 27.7303 2.72903 13.00127 22:58:00 10/19/06 22:59 27.7321 2.72904 13.00306 22:59:00 10/19/06 23:00 27.7332 2.72864 13.00456 23:00:00 10/19/06 23:01 27.7342 2.72853 13.00567 23:01:00 10/19/06 23:02 27.7361 2.72875 13.00735 23:02:00 10/19/06 23:03 27.7381 2.72849 13.00961 23:03:00 10/19/06 23:04 27.7401 2.72854 13.01156 23:04:00 10/19/06 23:05 27,7407 2.72872 13.01198 23:05:00 10/19/06 23:06 27.7427 2.72798 13.01472 23:06:00 10/19/06 23:07 27.7444 2.72784 13.01656 23:07:00 27.7463 2.72765 13.01865 10/19/06 23:08 23:08:00 10/19/06 23:09 27.748 2.72775 13.02025 23:09:00 10/19/06 23:10 27.7497 2.72766 13.02204 23:10:00 2.72771 13.02389 10/19/06 23:11 27.7516 23:11:00 10/19/06 23:12 27.7538 2.72745 13.02635 23:12:00 27.7555 10/19/06 23:13 2.72771 13.02779 23:13:00 10/19/06 23:14 27.7567 2.72755 13.02915 23:14:00 10/19/06 23:15 27.7582 2.72704 13.03116 23:15:00 10/19/06 23:16 27.7589 2.72684 13.03206 23:16:00 10/19/06 23:17 27.7607 2.72588 13.03482 23:17:00 10/19/06 23:18 27.7628 2.72543 13.03737 23:18:00 10/19/06 23:19 27,7638 2.72517 13.03863 23:19:00 10/19/06 23:20 27.7656 2.72508 13.04052 23:20:00 10/19/06 23:21 27.7669 2.72412 13.04278 23:21:00 10/19/06 23:22 27.7692 2.7246 13.0446 23:22:00 10/19/06 23:23 27.7709 2.72464 13.04626 23:23:00 10/19/06 23:24 27.7725 2.72459 13.04791 23:24:00 10/19/06 23:25 27.7742 2.72474 13.04946 23:25:00 10/19/06 23:26 27.7754 2.72468 13.05072 23:26:00 10/19/06 23:27 27.7774 2,72494 13,05246 23:27:00 10/19/06 23:28 27.7794 2.72503 13.05437 23:28:00 10/19/06 23:29 2.72573 13.05487 27,7806 23:29:00 10/19/06 23:30 27.7827 2.72574 13.05696 23:30:00 10/19/06 23:31 27.784 2,72554 13,05846 23:31:00 10/19/06 23:32 2.72607 13.06053 27.7866 23:32:00 10/19/06 23:33 27.7877 2.72671 13.06099 23:33:00 10/19/06 23:34 27.7897 2.72645 13.06325 23:34:00

10/19/06 23:35

10/19/06 23:36

27.791

27.793

2.72735 13.06365

2.72722 13.06578 23:36:00

23:35:00

Water Level Recording Data Step Test Performance Manually Collected Data **GPM** SpCond Data Baro **SWL** Time DRWDN Curve **GPM** Time Time 27.7951 2.72733 13.06777 23:37:00 10/19/06 23:37 27.7961 2.72759 13.06851 23:38:00 10/19/06 23:38 10/19/06 23:39 27.7983 2.72741 13.07089 23:39:00 10/19/06 23:40 27.8005 2.72707 13.07343 23:40:00 27.8016 2.72684 13.07476 23:41:00 10/19/06 23:41 2.72687 13.07543 23:42:00 10/19/06 23:42 27.8023 27.804 2.72594 13.07806 23:43:00 10/19/06 23:43 10/19/06 23:44 27,8066 2.7255 13.0811 23:44:00 10/19/06 23:45 27.8069 2.72523 13.08167 23:45:00 27.808 2.72494 13.08306 23:46:00 10/19/06 23:46 10/19/06 23:47 27.8103 2.72511 13.08519 23:47:00 2.72536 13.08644 10/19/06 23:48 27.8118 23:48:00 10/19/06 23:49 27.8134 2.72581 13.08759 23:49:00 2.72576 13.08964 10/19/06 23:50 27.8154 23:50:00 10/19/06 23:51 27.8164 2.72491 13.09149 23:51:00 2.72459 13.09351 23:52:00 10/19/06 23:52 27.8181 2.72335 13.09625 23:53:00 10/19/06 23:53 27.8196 10/19/06 23:54 27.8212 2.72227 13.09893 23:54:00 2.72127 13.10043 10/19/06 23:55 27.8217 23:55:00 27.8239 2.72076 13,10314 23:56:00 10/19/06 23:56 27.825 2.72017 13.10483 10/19/06 23:57 2.72078 13.10622 27.827 10/19/06 23:58 10/19/06 23:59 27.8283 2.72125 13.10705 27.8313 2.7226 13.10904 10/20/06 0:00 2.72284 13.11106 10/20/06 0:01 27.8339 27.835 2.72355 13.11145 10/20/06 0:02 10/20/06 0:03 27.8364 2.72355 13.11285 10/20/06 0:04 27.8381 2.72372 13.11438 27.8398 2.72291 13,11689 10/20/06 0:05 10/20/06 0:06 27.841 2.72297 13.11803 27.8432 2.72297 13.12023 10/20/06 0:07 10/20/06 0:08 27.8446 2.72222 13.12238 2.72203 13.12407 10/20/06 0:09 27.8461 10/20/06 0:10 27.8481 2.72239 13.12571 27.85 2.72238 13.12762 10/20/06 0:11 27.8511 2.72231 13.12879 10/20/06 0:12 10/20/06 0:13 27,853 2.72176 13,13124 2.72176 13.13264 10/20/06 0:14 27.8544 2.7215 13.1341 10/20/06 0:15 27.8556 10/20/06 0:16 27.8576 2.72209 13.13551 27.8595 2.72232 13.13718 10/20/06 0:17 10/20/06 0:18 27.8622 2.72301 13,13919 10/20/06 0:19 27.8634 2.72355 13.13985 27.8658 2.72331 13.14249 10/20/06 0:20 27,8669 2.7242 13.1427 10/20/06 0:21 2.72393 13.14627 10/20/06 0:22 27.8702 10/20/06 0:23 27.8706 2.72349 13.14711 2.7234 13.148 10/20/06 0:24 27.8714 10/20/06 0:25 27.8735 2.7229 13.1506 2.72173 13.15367 10/20/06 0:26 27.8754

| ianuali | y Collected | Data | | Water Level Re | cording Da | ıa | | | Step Te | est Performai | nce |
|---------|-------------|------|--------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------------------------------------------------|---------|---------------|------|
| ime | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curv |
| | | | | 10/20/06 0:27 | 27.8767 | 2.72183 | 13.15487 | | | | |
| | | | | 10/20/06 0:28 | | | 13.15652 | | | | |
| | | | | 10/20/06 0:29 | | | 13.15725 | | | | |
| | | | | 10/20/06 0:30 | | | 13,15944 | | | | |
| | | | | 10/20/06 0:31 | | | 13.16047 | | | | |
| | | | | 10/20/06 0:32 | | | 13.16262 | | | | |
| | | | | 10/20/06 0:33 | and the second of the first | the first of the second of the | 13.16347 | | | | |
| | | | | 10/20/06 0:34 | | | 13.16597 | | | | |
| | | | | 10/20/06 0:35 | 27.8887 | 2.71944 | 13.16926 | | | | |
| | | | | 10/20/06 0:36 | | | 13.17204 | | | | |
| | | | | 10/20/06 0:37 | | | 13.17419 | | | | |
| | | | | 10/20/06 0:38 | 27.8927 | 2.71549 | 13.17721 | | | | |
| | | | | 10/20/06 0:39 | | | 13.17952 | | | | |
| | | | | 10/20/06 0:40 | | | | | | | |
| | | | | 10/20/06 0:41 | | | 13.18282 | | | | |
| | | | | 10/20/06 0:42 | | | 13.18413 | | | | |
| | | | | 10/20/06 0:43 | | | 13.18552 | | | | |
| | | | | 10/20/06 0:44 | | 447,6537 8 | 13.18704 | | | | |
| | | | | 10/20/06 0:45 | | | 13.18911 | | | | |
| | | | | 10/20/06 0:46 | | | 13.19102 | | | | |
| | | | | 10/20/06 0:47 | | | 13.19331 | | | | |
| | | | | 10/20/06 0:48 | | | 13.19557 | | | | |
| | | | | 10/20/06 0:49 | | | 13.19774 | | | | |
| | | | | 10/20/06 0:50 | | | 13.19954 | | | | |
| | | | | 10/20/06 0:51 | | 40.00 | 13.20126 | | • | | |
| | | | | 10/20/06 0:52 | | | 13.20294 | | | | |
| | | | | 10/20/06 0:53 | | THE RESERVE OF THE SAME | 13.20419 | | | | |
| | | | | 10/20/06 0:54 | | | 13.20581 | | | | |
| | | | | 10/20/06 0:55 | | | 13.20815 | | | | |
| | | | | 10/20/06 0:56 | | | 13.20933 | | | | |
| | | | | 10/20/06 0:57 | | | 13.21195 | | | | |
| | | | | 10/20/06 0:58 | | | 13.21412 | | | | |
| | | | | 10/20/06 0:59 | | | 13.21599 | | | | |
| | | | | 10/20/06 1:00 | | | 13.21922 | | | | |
| | | | | 10/20/06 1:01 | | | | | | | |
| | | | | 10/20/06 1:02 | | | 13.22379 | | | | |
| | | | | 10/20/06 1:03 | | | 13.22546 | | | | |
| | | | | 10/20/06 1:04 | | | 13.22516 | | | | |
| | | | | 10/20/06 1:05 | | | 13.22791 | | | | |
| | | | | 10/20/06 1:06 | | | 13.22873 | | * | | |
| | | | | 10/20/06 1:07 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | | 13.23201 | | | | |
| | | | | 10/20/06 1:08 | | | 13.23328 | | | | |
| | | | | 10/20/06 1:09 | | | 13.23567 | | | | |
| | | | | 10/20/06 1:10 | The state of the s | | 13.23742 | | | | |
| | | | | 10/20/06 1:11 | | | 13.23903 | 2 C. C. C. C. C. M. 2 C. | | | |
| | | | | 10/20/06 1:12 | - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 | C. S. C. St. G. # 275 St. 200 CO. | 13.24067 | | | | |
| | | | | 10/20/06 1:13 | 21 22 22 22 | The second secon | 13.24221 | 198 | | | |
| | | | | 10/20/06 1:14 | - A C C P S A S A S A S A S A S A S A S A S A S | | 13.24545 | | | | |
| | | | | 10/20/06 1:15 | | 1149 14. 9482308300000 | 13.24638 | | | | |
| | | | | 10/20/06 1:16 | 447 M. S. S. S. S. S. S. S. S. | 1 TO SERVICE TO SERVICE THE SERVICE STREET | 13.24857 | | | | |

| lanually | y Collected | Data | | Water Level Red | cording Dat | a | | | Step Te | est Performar | nce |
|----------|-------------|------|--------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------|----------------------------------------------------------|---------|---------------|-------|
| ime | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
| | | | | 10/20/06 1:17 | 27.9514 | 2 70016 | 13.25124 | (rg a ringer | | | |
| | | | | 10/20/06 1:18 | The second of the second | | | 14 (4) (4) (4) (4) | | | |
| | | | | 10/20/06 1:19 | 11. On the Control of the Control | | 13.25754 | | | | |
| | | | | 10/20/06 1:20 | 1. For 1886 1986 11 1986 11 11 11 11 11 11 11 11 11 11 11 11 11 | | 13.25952 | | | | |
| | | | | 10/20/06 1:21 | 27.9555 | | 13.26037 | | | | |
| | | | | 10/20/06 1:22 | | | 13.26192 | | | | |
| | | | | 10/20/06 1:23 | | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 13.26374 | | | | |
| | | | | 10/20/06 1:24 | | | 13.26543 | | | | |
| | | | | 10/20/06 1:25 | | | 13.26612 | | | | |
| | | | | 10/20/06 1:26 | | 2.69439 | | | | | |
| | | | | 10/20/06 1:27 | A CONTRACTOR OF THE CONTRACTOR | | 13.27019 | | | | |
| | | | | 10/20/06 1:28 | | | 13.27303 | | | | |
| | | | | 10/20/06 1:29 | | 6 A | 13.27775 | | | | |
| | | | | 10/20/06 1:30 | | SAC CARREST CARS | 13.27528 | | | | |
| | | | | 10/20/06 1:31 | 27.9857 | | 13.29455 | | | | |
| | | | | 10/20/06 1:32 | | | 13.28997 | | | | |
| | | | | 10/20/06 1:33 | THE PROPERTY OF STREET | a frage days to | 13.26903 | | | | |
| | | | | 10/20/06 1:34 | 27.9873 | | 13.29808 | | | | |
| | | | | 10/20/06 1:35 | | | 13.27438 | | | | |
| | | | | 10/20/06 1:36 | | | 13.30556 | | | | |
| | | | | 10/20/06 1:37 | | | 13.27294 | | | | |
| | | | | 10/20/06 1:38 | | | 13.29584 | | | | |
| | | | | 10/20/06 1:39 | | | 13.30325 | | | | |
| | | | | 10/20/06 1:40 | | | 13.29882 | | | | |
| | | | | 10/20/06 1:41 | THE STATE OF THE STATE OF THE STATE OF | 2.6873 | | | | | |
| | | | | 10/20/06 1:42 | | | 13.30024 | | | | |
| | | | | 10/20/06 1:43 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | | 13.29573 | 34. | | | |
| | | | | 10/20/06 1:44 | 27.9835 | | 13.29637 | 1.144 | | | |
| | | | | 10/20/06 1:45 | | 2.68609 | | | | | |
| | | | | 10/20/06 1:46 | 14 1 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | | 13.30503 | | | | |
| | | | | 10/20/06 1:47 | THE REPORT OF THE PROPERTY OF THE PARTY OF T | | 13.30552 | | | | |
| | | | | 10/20/06 1:48 | | | 13.30861 | | | | |
| | | | | 10/20/06 1:49 | | | 13.31231 | | | | |
| | | | | 10/20/06 1:50 | | | 13.31412 | | | | |
| | | | | 10/20/06 1:51 | 28.0015 | 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - | 13.31787 | 1 March 2012 William 1975 1 Av. 1 | | | |
| | | | | 10/20/06 1:52 | 28 | | 13.31662 | | | | |
| | | | | 10/20/06 1:53 | | 1. "是一个在2mm的",只有是 | 13.31927 | AT 4 1 12 - A 2000 1200 13 1 | | | |
| | | | | 10/20/06 1:54 | 28.0009 | | 13.31778 | 15 / 2 0 / 0 / 0 / 1 1 1 1 1 1 1 1 1 1 | | | |
| | | | | 10/20/06 1:55 | | | 13.32055 | | | | |
| | | | | 10/20/06 1:56 | | 2.68326 | | | | | |
| | | | | 10/20/06 1:57 | 28.0076 | 2.6833 | A 1 (1) A 1 (1) A 10 (2) A 10 (2) | 54345 ACC 40 ACC 4 | | | |
| | | | | 10/20/06 1:58 | | THE COURT OF THE PARTY OF THE PARTY. | 13.32388 | | | | |
| | | | | 10/20/06 1:59 | CONTRACTOR OF THE STATE OF THE | ARTON CONTRACTOR CONTRACTOR | 13.32608 | 2 109 m 2 c | | | |
| | | | | 10/20/06 2:00 | | | 13.32677 | | | | |
| | | | | 10/20/06 2:01 | 28.0158 | | 13.33194 | | | | |
| | | | | 10/20/06 2:02 | | | 13.32949 | | | | |
| | | | | 10/20/06 2:03 | | | 13.33622 | | | | |
| | | | | 10/20/06 2:04 | | | 13.33293 | | | | |
| | | | | 10/20/06 2:05 | | | 13.33293 | | | | |
| | | | | 10/20/06 2:06 | | | 13.33815 | | | | |

| Manuall | y Collected | Data | | Water Level Red | cording Dat | a | | | Step Te | est Performa | nce |
|---------|-------------|------|--------|-----------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------|-------|
| Time | GPM | Time | SpCond | | Data | Ваго | SWL | Time | GPM | DRWDN | Curve |
| | | | | 10/20/06 2:07 | 28.0219 | 2.68176 | 13.34014 | | | | |
| | | | | 10/20/06 2:08 | 28.0225 | 100 | 13.34111 | | | | |
| | | | | 10/20/06 2:09 | | 2.6814 | | | | | |
| | | | | 10/20/06 2:10 | | | 13.34574 | | | | |
| | | | | 10/20/06 2:11 | 28.0272 | 0.0000000000 | 13.34654 | P. C. S. C. S. | | | |
| | | | | 10/20/06 2:12 | | | 13.34793 | | | | |
| | | | | 10/20/06 2:13 | | | 13.34571 | | | | |
| | | | | 10/20/06 2:14 | | | 13.34908 | | | | |
| | | | | 10/20/06 2:15 | | 100 100 100 100 100 100 100 100 100 100 | 13.35252 | | | | |
| | | | | 10/20/06 2:16 | | | 13.35299 | | | | |
| | | | | 10/20/06 2:17 | | | 13.35279 | | | | |
| | | | | 10/20/06 2:18 | | | 13.35801 | | | | |
| | | | | 10/20/06 2:19 | | 2.6782 | | | | | |
| | | | | 10/20/06 2:20 | | | 13.35915 | Jack to the State of the State | | | |
| | | | | 10/20/06 2:21 | 28.0381 | | 13.36074 | | | | |
| | | | | 10/20/06 2:22 | | 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 13.36354 | Control of the second | | | |
| | | | | 10/20/06 2:23 | | | 13,36408 | | | | |
| | | | | 10/20/06 2:24 | | | 13,36484 | | | | |
| | | | | 10/20/06 2:25 | - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 | | 13.36852 | | | | |
| | | | | 10/20/06 2:26 | | Alleria Committee and the second | 13.36979 | | | | |
| | | | | 10/20/06 2:27 | 28.0456 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 13.37055 | | | | |
| | | | | 10/20/06 2:28 | | | 13.37164 | | | | |
| | | | | 10/20/06 2:29 | | | 13.37489 | | | | |
| | | | | 10/20/06 2:30 | | | 13.37592 | Table 1 Art Section 1 | | | |
| | | | | 10/20/06 2:31 | 28.0507 | | 13.37647 | a Share Francis Control of the Contr | | | |
| | | | | 10/20/06 2:32 | | | 13.37924 | | | | |
| | | | | 10/20/06 2:33 | は、イタ料・質 保有を、対抗に | 2.6739 | 120 March 1/44 | NA 1775 : 1. 6 480 (A. Abade) : 1 | | | |
| | | | | 10/20/06 2:34 | 28.0548 | 1.0000000000000000000000000000000000000 | 13.38183 | the wife of the same of the sa | | | |
| | | | | 10/20/06 2:35 | 28.0557 | | 13.38348 | 12.47 | | | |
| | | | | 10/20/06 2:36 | | | 13.38548 | 3213 1 Z 1969 15 | | | |
| | | | | 10/20/06 2:37 | 28.0581 | 2.6699 | | | | | |
| | | | | 10/20/06 2:38 | | | 13.38912 | The state of the s | | | |
| | | | | 10/20/06 2:39 | | 44-57000 | 13.38951 | | | | |
| | | | | 10/20/06 2:40 | | 17 JAN 1807 P. J. | 13.39089 | | | | |
| | | | | 10/20/06 2:41 | 28.0613 | | 13.39194 | | | | |
| | | | | 10/20/06 2:42 | | | 13.39354 | | | | |
| | | | | 10/20/06 2:43 | | | | | | | |
| | | | | 10/20/06 2:44 | 28.0676 | | 13.39562 | | | | |
| | | | | 10/20/06 2:45 | | | 13.39548 | | | | |
| | | | | 10/20/06 2:46 | 28.0699 | | 13.39818 | and the control of th | | | |
| | | | | 10/20/06 2:47 | 28.0701 | | 13.39772 | | | | |
| | | | | 10/20/06 2:48 | 28.0714 | | 13.39903 | | | | |
| | | | | 10/20/06 2:49 | | | 13.40105 | | | | |
| | | | | 10/20/06 2:50 | 28.074 | | 13,40152 | | | | |
| | | | | 10/20/06 2:51 | 28.0759 | | 13.40358 | | | | |
| | | | | 10/20/06 2:52 | | C 1 6 6 6 6 6 6 7 6 7 6 7 6 7 6 7 6 7 6 7 | 13.40363 | \$25000 PERSON SECTION AND APPLICATION OF THE PERSON AND APPLICATION AND APPLICATION AND APPLICATION AP | | | |
| | | | | 10/20/06 2:53 | - FTR- 9A CYTS-80CCAL 97-113. | 1.087,2580,8080,807,4 | 13.40616 | 2 S 1486 2 19 L 6 19 KK L | | | |
| | | | | 10/20/06 2:54 | *** A.2 (CORR CYCS) | - POWER STATE OF THE PARTY OF T | 13.40633 | | | | |
| | | | | 10/20/06 2:55 | 28.0785 | G CONTRACTOR OF THE SECOND | 13.40945 | 94900 S. J. & FOLKER, N. S. | | 4. | |
| | | | | 10/20/06 2:56 | | | 13.41177 | | | | |

| Manuali | y Collected | Data | | Water Level Rec | ording Dat | a | | | Step Te | st Performai | nce |
|---------|-------------|------|--------|--------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------|-------|
| Time | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
| | | | | 10/20/06 2:57 | 28.0798 | 2.66787 | 13.41193 | | | | |
| | | | | 10/20/06 2:58 | 28.0816 | | 13.41368 | | | | |
| | | | | 10/20/06 2:59 | 28.0822 | | 13.4145 | | | | |
| | | | | 10/20/06 3:00 | 28.0842 | | 13.41657 | | | | |
| | | | | 10/20/06 3:01 | 28.0843 | | | | | | |
| | | | | 10/20/06 3:02 | 28.0858 | 2.66781 | 13.41799 | | | | |
| | | | | 10/20/06 3:03 | 28.0865 | 26.345 - 36.465 - 36.465 | | | | | |
| | | | | 10/20/06 3:04 | 28.088 | TEN TO THE STREET THE STREET | 13.42044 | 7. | | | |
| | | | | 10/20/06 3:05 | 28.0887 | 125000000000000000000000000000000000000 | 13.42214 | | | | |
| | | | | 10/20/06 3:06 | 28.09 | | 13.42369 | | | | |
| | | | | 10/20/06 3:07 | 28.0903 | | 13.42426 | Karakara | | | |
| | | | | 10/20/06 3:08 | 28.0929 | 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 13.42744 | | | | |
| , | | | | | | 10 - 10 May 12 10 10 10 10 10 10 10 10 10 10 10 10 10 | State of the State of the | | | | |
| | | | | 10/20/06 3:09 10/20/06 3:10 | 28.0916 28.0938 | 2.66601 | 13.42585 | 73 A-3 | | | |
| | | | | | 7938.7 38 63 C C C 30. 6 | 2.8656 | 13.42779 | | | | |
| | | | | 10/20/06 3:11 | 28.0946 | 100 m de 200 | 13.429 | | | | |
| | | | | 10/20/06 3:12 | 28.0945 | | 13.42904 | | | | |
| | | | | 10/20/06 3:13 | 28.0964 | 2.6652 | 13.4312 | di. | | | |
| | | | | 10/20/06 3:14 | 28.097 | 2.66492 | 13.43208 | | | | |
| | | | | 10/20/06 3:15 | 28.0982 | | 13.4341 | 944 FAST | | | |
| | | | | 10/20/06 3:16 | 28.0996 | | 1.0 | | | | |
| | | | | 10/20/06 3:17 | 28.0995 | 2.66333 | | je i jelo | | | |
| | | | | 10/20/06 3:18 | 28.1016 | 2, 2000 | 1 Table 1 Table 10 Table 10 | | | | |
| | | | | 10/20/06 3:19 | 28.102 | | | | | | |
| | | | | 10/20/06 3:20 | 28.1033 | | 13.44061 | | | | |
| | | | | 10/20/06 3:21 | 28.1037 | 2.6635 | 13,4402 | | | | |
| | | | | 10/20/06 3:22 | 28.1056 | 2.66363 | 13.44197 | | | | |
| | | | | 10/20/06 3:23 | 28.1067 | 2.66386 | | | | | |
| | | | | 10/20/06 3:24 | 28,1081 | 2.66471 | 100000000000000000000000000000000000000 | | | | |
| | | | | 10/20/06 3:25 | 28.1093 | | 13.44463 | a Paris - | | | |
| | | | | 10/20/06 3:26 | 28.1094 | 2.66538 | 13,44402 | 37 | | | |
| | | | | 10/20/06 3:27 | 28.1122 | | 13.44632 | 4 62 | | | |
| | | | | 10/20/06 3:28 | 28.112 | to the contract of the second | 13.44539 | in the state of th | | | |
| | | | | 10/20/06 3:29 | 28.1132 | | 13,44638 | | | | |
| | | | | 10/20/06 3:30 | 28.1142 | | 13,44796 | | | | |
| | | | | 10/20/06 3:31 | 28.1139 | | 13.44828 | | | | |
| | | | | 10/20/06 3:32 | 28.1142 | 7 | 13.44917 | | | | |
| | | | | 10/20/06 3:33 | 28.1168 | 2.6647 | 13,4521 | | | | |
| | | | | 10/20/06 3:34 | 28.1167 | 2.66429 | 13.45241 | | | | |
| | | | | 10/20/06 3:35 | 28.1167 | 2.66414 | 13.45256 | | | | |
| | | | | 10/20/06 3:36 | 28.1188 | 2.66406 | 13.45474 | | | | |
| | | | | 10/20/06 3:37 | 28.1185 | | 13.45457 | | | | |
| | | | | 10/20/06 3:38 | 28.1203 | 2.66399 | 13.45631 | | | | |
| | | | | 10/20/06 3:39 | 28,1209 | 2.66379 | 13.45711 | | | | |
| | | | | 10/20/08 3:40 | 28.1213 | 2.66455 | 13.45675 | | | | |
| | | | | 10/20/06 3:41 | 28.1224 | 2.66483 | 13.45757 | er er Pr | | | |
| | | | | 10/20/06 3:42 | 28.1231 | 2.865 | 13.4581 | | | | |
| | | | | 10/20/06 3:43 | 28.1246 | 2.66624 | 13,45836 | 46.4 | | | |
| | | | | 10/20/06 3:44 | 28.1259 | 2.6662 | 13,4597 | | | | |
| | | | | 10/20/06 3:45 | 28.1262 | | 13.4598 | | | | |
| | | | | 10/20/06 3:46 | 28.1269 | | 13.46073 | | | | |

Manually Collected Data

Water Level Recording Data

| Time | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
|------|-----|------|--------|---------------|------------------------------------------------|------------------------------------------------------------|--------------------------------|--------------------------------------------------|-----|-------|-------|
| | | | | 10/20/06 3:47 | 28.1267 | 2.66555 | 13.46115 | | | | |
| | | | | 10/20/06 3:48 | 28.1281 | | 13.46355 | | | | |
| | | | | 10/20/06 3:49 | 28.1285 | | 13.46418 | | | | |
| | | | | 10/20/06 3:50 | 28.1301 | | 13.46628 | | | | |
| | | | | 10/20/06 3:51 | 28.129 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 13.46627 | | | | |
| | | | | 10/20/06 3:52 | | | 13,46764 | | | | |
| | | | | 10/20/06 3:53 | P - 401 / 200 / 302 (0.100) | | 13.46958 | | | | |
| | | | | 10/20/06 3:54 | 28.1309 | 1 3330402/434 | 13,47127 | | | | |
| | | | | 10/20/06 3:55 | 28.1309 | - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 | 13.47204 | | | | |
| | | | | 10/20/06 3:56 | 28.1313 | 2.65693 | | | | | |
| | | | | 10/20/06 3:57 | 28.1311 | 2.6565 | | | | | |
| | | | | 10/20/06 3:58 | 28.1317 | 2.6574 | | | | | |
| | | | | 10/20/06 3:59 | 28.1334 | | 13.47517 | | | | |
| | | | | 10/20/06 4:00 | 28.1356 | | 13.47554 | | | | |
| | | | | 10/20/06 4:01 | 28.1368 | | 13.47476 | | | | |
| | | | | 10/20/06 4:02 | 28.1377 | | 13.47397 | | | | |
| | | | | 10/20/06 4:03 | 28.139 | | 13.47436 | | | | |
| | | | | 10/20/06 4:04 | | | 13,47452 | | | | |
| | | | | 10/20/06 4:05 | 28.1399 | | 13.47453 | | | | |
| | | | | 10/20/06 4:06 | 28.1395 | | 13.47524 | | | | |
| | | | | 10/20/06 4:07 | 28.14 | | 13.47676 | | | | |
| | | | | 10/20/06 4:08 | 28.141 | | 13,47787 | | | | |
| | | | | 10/20/06 4:09 | 28.1407 | | 13.47834 | | | | |
| | | | | 10/20/06 4:10 | P 48 32 667 11 13 10 | 2.6623 | | | | | |
| | | | | 10/20/06 4:11 | 28.142 | | | | | | |
| | | | | 10/20/06 4:12 | かいも何から話して よも | 2.66342 | CONTRACTOR STATE OF THE SEASON | | | | |
| | | | | 10/20/06 4:13 | 28.143 | 2.66401 | No. 10. India and 1856 Common | | | | |
| | | | | 10/20/06 4:14 | 28.1449 | 2.6646 | C | | | | |
| | | | | 10/20/06 4:15 | 28.146 | - C. A. W. W. S. | 13.47958 | | | | |
| | | | | 10/20/06 4:16 | 28.1465 | 1 000000000000000000000000000000000000 | 13.47869 | | | | |
| | | | | 10/20/06 4:17 | 28.1472 | | 13.47856 | | | | |
| | | | | 10/20/06 4:18 | | 1 - Saber - Paris (1967) | 13.47853 | | | | |
| | | | | 10/20/06 4:19 | 28.1493 | | 13,47999 | [1] 이 사람이 있다. (1) 기가 기가 있다. | | | |
| | | | | 10/20/06 4:20 | 28.1494 | | 13.47979 | | | | |
| | | | | 10/20/06 4:21 | 28.1509 | | 13.48151 | | | | |
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| | | | | 10/20/06 4:23 | 28.1508 | 100000000000000000000000000000000000000 | 13.48126 | | | | |
| | | | | 10/20/06 4:24 | 28.1509 | | 13.48201 | | | | |
| | | | | 10/20/06 4:25 | 28.1507 | * ** ** ** ** ** ** ** ** ** ** ** ** * | 13.48197 | | | | |
| | | | | 10/20/06 4:26 | 28.1509 | | 13.48237 | | | | |
| | | | | 10/20/06 4:27 | 28.1527 | | 13.48431 | | | | |
| | | | | 10/20/06 4:28 | | 2 - 10 AMERICAN STREET | 13.48363 | | | | |
| | | | | 10/20/06 4:29 | 28.1527 | | 13.48374 | 100 m 27 m 24 m 25 | | | |
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| | | | | 10/20/06 4:34 | 28.1547 | 2.6699 | TO THE RESIDENCE OF ALCOHOLOGY | | | | |
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| | | | | 10/20/06 4:37 | 28.1558 | 2 67038 | 13.48542 | | | | |
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| | | | | 10/20/06 4:39 | ************************************** | 2.6715 | | | | | |
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| | | | | 10/20/06 4:41 | 28,1583 | | 13.48645 | | | | |
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| | | | | 10/20/06 4:51 | 28.1603 | | 13.48816 | | | | |
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| | | | | 10/20/06 5:03 | | 2.66885 | | | | | |
| | | | | 10/20/08 5:04 | 28.1602 | 2.66884 | | | | | |
| | | | | 10/20/06 5:05 | | 2.6685 | | | | | |
| | | | | 10/20/08 5:06 | | | 13.49222 | 0.000 | | | |
| | | | | 10/20/06 5:07 | 28.16 | 2.66875 | | * 1 | | | |
| | | | | 10/20/06 5:08 | 28.1606 | 2.66947 | | | | | |
| | | | | 10/20/06 5:09 | | | 13.49135 | | | | |
| | | | | 10/20/06 5:10 | | 2.66961 | | | | | |
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| | | | | 10/20/06 5:12 | Market State of the State of th | | 13.49132 | | | | |
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| | | | | 10/20/06 5:15 | 290, A. C. | | 13.49251 | | | | |
| | | | | 10/20/06 5:16 | - CO 2007 PRO 100 SANS DAY | 2.66836 | | 4.1 | | | |
| | | | | 10/20/06 5:17 | Committee of the commit | 2.66825 | | | | | |
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| | | | | 10/20/06 5:20 | 28.1599 | 2.66762 | 7 CH C C 10 TO SUPPLY | | | | |
| | | | | 10/20/06 5:21 | 28.1594 | | 13.49255 | | | | |
| | | | | 10/20/06 5:22 | | | 13.49275 | | | | |
| | | | | 10/20/06 5:23 | | 2.66666 | | | | | |
| | | | | 10/20/06 5:24 | | 2.66652 | | | | | |
| | | | | 10/20/06 5:25 | | 2.66652 | * * * 76 . 1965-1103 | | | | |
| | | | | 10/20/06 5:26 | | | 13.49258 | | | | |

Manually Collected Data

Water Level Recording Data

Step Test Performance

Time GPM Time SpCond

Data Baro SWL Time GPM DRWDN Curve

10/20/06 5:27 28.1587 2.66672 13.49198
10/20/06 5:28 28.1584 2.66745 13.49095
10/20/06 5:29 28.159 2.66696 13.49204
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| 10/20/06 5:28 | 28.1584 | 2.66745 | 13.49095 |
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| 10/20/06 5:29 | 28.159 | 2.66696 | 13.49204 |
| 10/20/06 5:30 | 28.1573 | 2.66696 | 13.49034 |
| 10/20/06 5:31 | 28.1581 | 2.66679 | 13.49131 |
| 10/20/06 5:32 | 28.1589 | 2.6664 | 13,4925 |
| 10/20/06 5:33 | 28.1577 | 2.66651 | 13.49119 |
| 10/20/06 5:34 | 28.157 | 2.66717 | 13.48983 |
| 10/20/06 5:35 | 28.1579 | 2.66746 | 13.49044 |
| 10/20/06 5:36 | 28.1576 | 2.66777 | 13.48983 |
| 10/20/06 5:37 | 28.1573 | 2.6682 | 13.4891 |
| 10/20/06 5:38 | 28.1567 | 2.66792 | 13.48878 |
| 10/20/06 5:39 | 28.1568 | 2.66842 | 13.48838 |
| 10/20/06 5:40 | 28.157 | | 13.48856 |
| 10/20/06 5:41 | 28.1564 | 2.66833 | 13.48807 |
| 10/20/06 5:42 | 28.1566 | 2.66912 | 13.48748 |
| 10/20/06 5:43 | 28.1561 | 2.6691 | |
| 10/20/06 5:44 | 28.1561 | 2.66944 | 13.48666 |
| 10/20/06 5:45 | 28.1556 | 2.66947 | 13.48613 |
| 10/20/06 5:46 | 28.156 | 2.66958 | 13.48642 |
| 10/20/06 5:47 | 28.1551 | 2.66953 | 13.48557 |
| 10/20/06 5:48 | 28.1553 | 2.66998 | 13.48532 |
| 10/20/06 5:49 | 28.1554 | 2.66904 | 13.48636 |
| 10/20/06 5:50 | 28.1551 | 2.66931 | 13.48579 |
| 10/20/06 5:51 | 28.1546 | 2.66945 | 13.48515 |
| 10/20/06 5:52 | 28.1547 | 2.66963 | 13.48507 |
| 10/20/06 5:53 | 28.154 | 2.66961 | |
| 10/20/06 5:54 | 28.1543 | | 13.48467 |
| 10/20/08 5:55 | 28,1536 | 2.67049 | 13.48311 |
| 10/20/06 5:56 | 28.1532 | 2.67074 | |
| 10/20/06 5:57 | 28.1536 | | 13.48243 |
| 10/20/06 5:58 | 28.1527 | | 13,48127 |
| 10/20/06 5:59 | 28.153 | | 13.48123 |
| 10/20/06 6:00 | 28.1522 | | 13.48035 |
| 10/20/06 6:01 | 28.153 | 7 to 21 to 2 | 13.48125 |
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| 10/20/06 6:03 | 28.152 | | 13,48017 |
| 10/20/06 6:04 | 28.1513 | | 13.47977 |
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| 10/20/06 6:06 | 28.1507 | 2.67211 | |
| 10/20/06 6:07 | 28.1502 | - 1 2 4 5 C SWANG 686 | 13,47796 |
| 10/20/06 6:08 | 28.1502 | | 13,47772 |
| 10/20/06 6:09 | 28.15 | | 13,47789 |
| 10/20/06 6:10 | 28.1495 | | 13.47645 |
| 10/20/06 6:11 | 28.1491 | 17 (SAMA) 37 (60) (SAM). | 13.47557 |
| 10/20/06 6:12 | 28.1494 | 7577777895798757 | |
| 10/20/06 6:13 | 28.1487 | 2.67397 | |
| 10/20/06 6:14 | 28.1478 | 2.67404 | |
| 10/20/06 6:15 | 28.1483 | 2.67399 | |
| 10/20/06 6:16 | 28.147 | 2.67383 | 13,47317 |
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| Manuall | y Collected | Data | | Water Level Re | cording Dat | a | | | Step Te | st Performar | nce |
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| Time | GPM | Time | SpCond | ··· | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
| | | | | 10/20/06 6:17 | 28.147 | 2.67367 | 13.47333 | | | | |
| | | | | 10/20/06 6:18 | | The second secon | 13.47364 | | | | |
| | | | | 10/20/06 6:19 | | 2.67353 | 13.47327 | | | | |
| | | | | 10/20/06 6:20 | | | 13.47282 | | | | |
| | | | | 10/20/06 6:21 | 28.1448 | 2.67321 | 13.47159 | | | | |
| | | | | 10/20/06 6:22 | 28.1446 | 2.67283 | 13.47177 | | | | |
| | | | | 10/20/06 6:23 | 28.1452 | 2.67331 | 13,47189 | | | | |
| | | | | 10/20/06 6:24 | 28.1453 | 2.6735 | 13.4718 | 4. | | | |
| | | | | 10/20/06 6:25 | | 2,67354 | 13,47056 | | | | |
| | | | | 10/20/06 6:26 | 28.1442 | 2.67391 | 13.47029 | | | | |
| | | | | 10/20/06 6:27 | 28.143 | 2.67467 | 13.46833 | | | | |
| | | | | 10/20/06 6:28 | 28.1431 | 2.67436 | 13.46874 | | | | |
| | | | | 10/20/06 6:29 | 28.1421 | 2.67416 | 13.46794 | | | | |
| | | | | 10/20/06 6:30 | 28.1417 | 2.67405 | 13.46765 | | | | |
| | | | | 10/20/06 6:31 | 28.1416 | 2.67404 | 13.46756 | | | | |
| | | | | 10/20/06 6:32 | 28,1408 | 2.67456 | 13.46624 | | | | |
| | | | | 10/20/06 6:33 | 28.1408 | 2.67459 | 13.46621 | 412.1. | | | |
| | | | | 10/20/06 6:34 | 28.1397 | 2.67433 | 13.46537 | | | | |
| | | | | 10/20/06 6:35 | 28.1398 | 2.67441 | 13.46539 | | | | |
| | | | | 10/20/06 6:36 | 28.1396 | 2.67507 | 13.46453 | 1,200 1 64 N | | | |
| | | | | 10/20/06 6:37 | 28.1383 | 2.67554 | 13.46276 | | | | |
| | | | | 10/20/06 6:38 | 28,139 | 2.67561 | 13.46339 | | | | |
| | | | | 10/20/06 6:39 | 28.1378 | 2.67621 | 13.46159 | | | | |
| | | | | 10/20/06 6:40 | 28.1374 | 2.67692 | 13.46048 | | | | |
| | | | | 10/20/06 6:41 | | 2.6771 | 13.4603 | | | | |
| | | | | 10/20/06 6:42 | 28.1368 | 2.6771 | 13.4597 | | | | |
| | | | | 10/20/06 6:43 | 28.1368 | 2.67726 | 13.45954 | | | | |
| | | | | 10/20/06 6:44 | 28.1365 | 2.67761 | 13.45889 | | | | |
| | | | | 10/20/06 6:45 | 28.136 | 2.67829 | 13.45771 | | | | |
| | | | | 10/20/06 6:46 | 28.1358 | 2.67969 | 13.45611 | | | | |
| | | | | 10/20/06 6:47 | 28.1353 | 2.6798 | 13.4555 | | | | |
| | | | | 10/20/06 6:48 | 28.1348 | 2.67972 | 13,45508 | | | | |
| | | | | 10/20/06 6:49 | 28.1334 | 2.6798 | 13.4536 | | | | |
| , | | | | 10/20/06 6:50 | 28.1333 | 2.67962 | 13.45368 | | | | |
| | | | | 10/20/06 6:51 | 28.133 | 2.68006 | 13.45294 | | | | |
| | | | | 10/20/06 6:52 | 28.1313 | | 13.45064 | | | | |
| | | | | 10/20/06 6:53 | 28.1318 | 2.68085 | 13.45095 | | | | |
| | | | | 10/20/06 6:54 | 28.1319 | 2.68149 | 13.45041 | | | | |
| | | | | 10/20/06 6:55 | 28.1312 | 2.68193 | 13.44927 | | | | |
| | | | | 10/20/06 6:56 | 28.1293 | | 13,44651 | | | | |
| | | | | 10/20/06 6:57 | 28.1301 | | 13,44743 | | | | |
| | | | | 10/20/06 6:58 | 28.1296 | 2.68306 | 13,44654 | | | | |
| | | | | 10/20/08 6:59 | 28.1285 | | 13.44474 | | | | |
| | | | | 10/20/06 7:00 | | | 13.44476 | | | | |
| | | | | 10/20/06 7:01 | 28.127 | | 13,44313 | | | | |
| | | | | 10/20/06 7:02 | \$256.5 m 1000 1000 1000 1000 1000 1000 1000 1 | | 13,44339 | | | | |
| | | | | 10/20/06 7:03 | 28,1264 | 2.6846 | AND PRO | | | | |
| | | | | 10/20/06 7:04 | 28 .1257 | 2.68494 | 13,44076 | 선생님 아이들이 그 | | | |
| | | | | 10/20/06 7:05 | 28.1248 | 2.68542 | 13.43938 | | | | |
| | | | | 10/20/06 7:06 | 380 110 110 110 110 110 110 110 110 110 1 | 2 68605 | 13.43835 | | | | |

Kapaa Highlands, Well No. 0419-05

Pump Test of October 19, 2006

| Manuall | ually Collected Data GPM Time SpCond | | | Water Level Re | cording Dat | а | | | Step Te | est Performar | nce |
|---------|---------------------------------------|------|--------|----------------|-------------|---------|----------|------|---------|---------------|-------|
| Time | GPM | Time | SpCond | | Data | Baro | SWL | Time | GPM | DRWDN | Curve |
| | | | | 10/20/06 7:07 | 28.1235 | 2.6874 | 13.4361 | | | | |
| | | | | 10/20/06 7:08 | 28.1226 | 2.68742 | 13.43518 | | | | |
| | | | | 10/20/06 7:09 | 28.1227 | 2.68859 | 13.43411 | | | | |
| | | | | 10/20/06 7:10 | 28.1222 | 2.69013 | 13.43207 | | | | |
| | | | | 10/20/06 7:11 | 28.1222 | 2.69066 | 13.43154 | | | | |
| | | | | 10/20/06 7:12 | 28.1218 | 2.69143 | 13.43037 | | | | |
| | | | | 10/20/06 7:13 | 28.1207 | 2.69171 | 13.42899 | | | | |
| | | | | 10/20/06 7:14 | 28.1204 | 2.69263 | 13.42777 | | | | |
| | | | | 10/20/06 7:15 | 28.1201 | 2.69331 | 13.42679 | | | | |

10/20/06 7:16 28.1219 2.69362 13.42828

Figure 3. Pumping Rate and Water Level During the 12-Hour Test

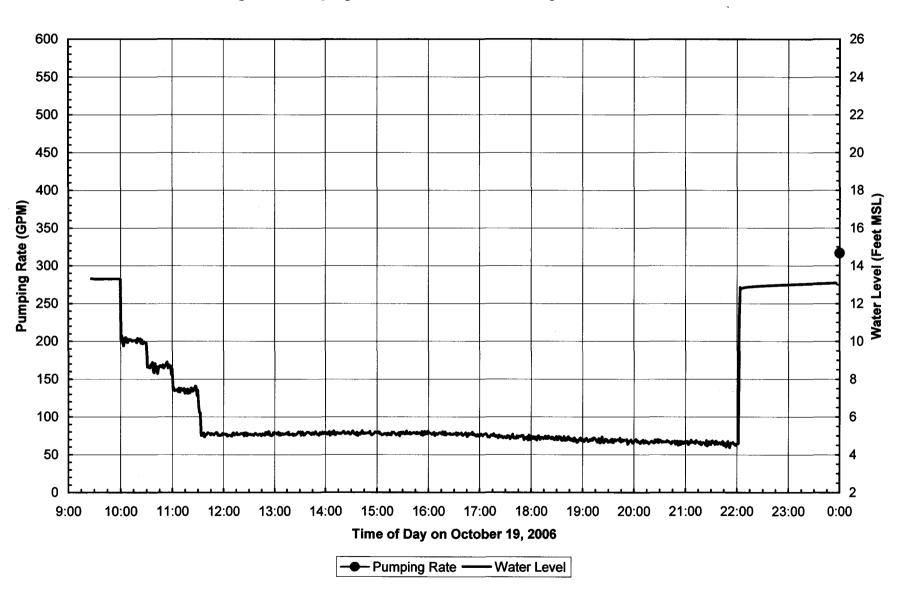


Figure 4. Hydraulic Performance of the Well Based on Step Test Data

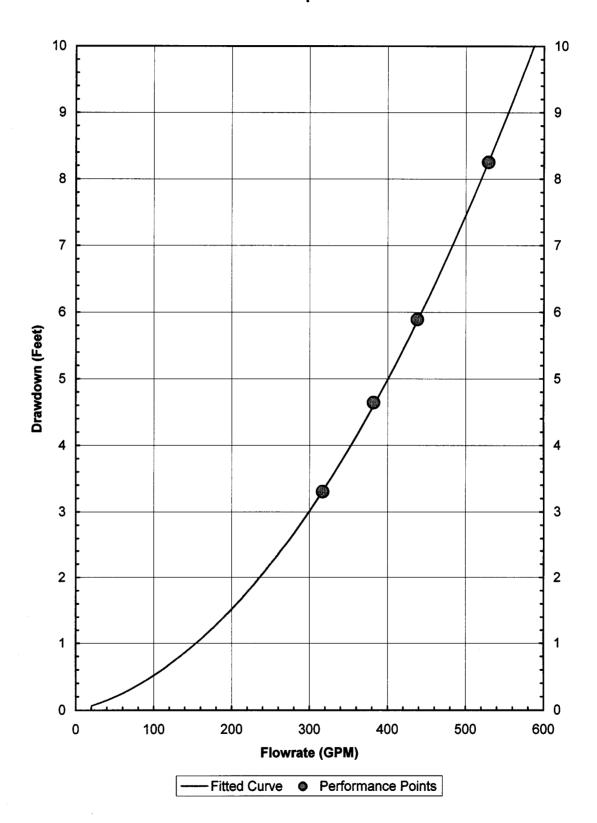
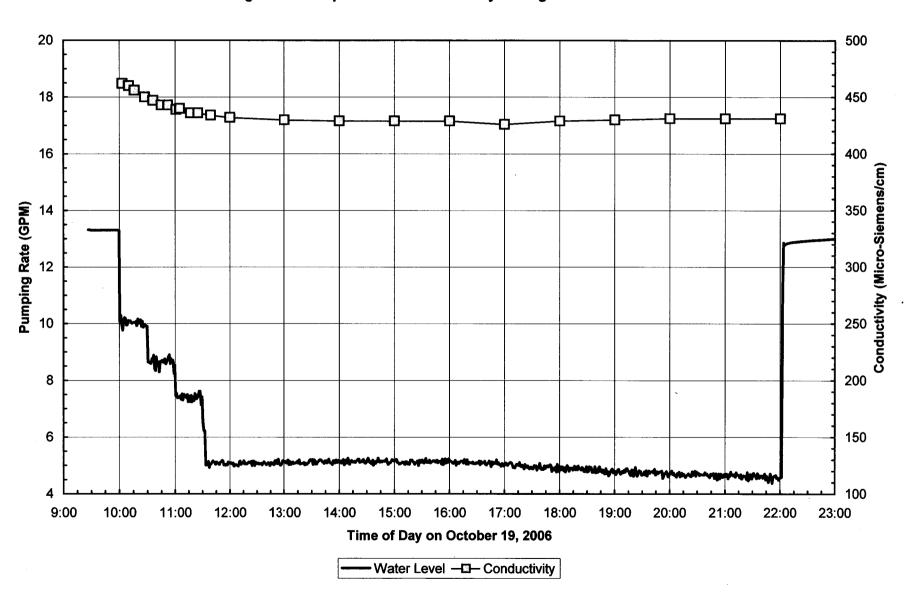


Figure 5. Pumped Water Conductivity through the 12-Hour Test



LINDA LINGLE



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

September 23, 2008

LAURA H. THIELEN

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. DONNA FAY K. KIYOSAKI, P.E. LAWRENCE H. MIIKE, M.D., J.D.

KEN C. KAWAHARA, P.E.

0419-05 wcr1 deficiencies

Marcus Frandsen High Plains Drilling

Dear Mr. Frandsen:

Request for Information, Well No. 0419-05 (TMK (4) 4-3-003:001)

The information you have provided to date regarding Well No. 0419-05 (Kapaa Highlands Well 1) has not resolved the questions and concerns we have about this well. As we have noted in previous correspondence to you (letters sent on January 2, 2007, June 12, 2007, and August 26, 2008), the well construction does not comply with the minimum casing requirements or minimum annular seal requirements specified in the *Hawaii Well Construction & Pump Installation Standards* (HWCPIS) (2004). Therefore, we remain unable to accept your Well Completion Report Part I, which we received on December 15, 2006. In the absence of additional information we can only conclude that the well is not properly constructed and may need to be abandoned and permanently sealed.

For this reason, we require more information from you before we can accept your well completion report, and before we can authorize installation of a permanent pump in the well. We understand, from a phone conversation on August 29, 2008 between our staff and Mike ('Shook') Lluellen, that a downhole video survey was done and provides a record of the as-built well details. Our staff's subsequent conversations with the engineer who performed the pumping test and made recommendations for drilling and properly constructing wells the Kapaa Highlands' water supply wells (refer to the report by Tom Nance prepared for Greg Allen, dated October 27, 2006), lead to the conclusion, again, that Well No. 0419-05 is not constructed in accordance with the HWCPIS and should probably be abandoned and permanently sealed.

Mike Lluellen, acting as your representative, told our staff on August 29 that the video is proof that the depth of the solid casing is 86 feet below ground surface (ft bgs), and not 68 ft bgs as originally recorded on your well completion report. Because of our ongoing concerns about how the well is constructed and the need to observe the character of the borehole sidewalls over the 192-foot uncased interval, we need to view the video record. Also, as explained in our August 26, 2008, letter, we are not convinced that the pumping tests done on the well represent the aquifer targeted for production. Our review of the video record may help resolve this concern. Please submit a copy of the video survey to our office within sixty (60) days from the date of this letter.

If the video record confirms the information provided on your Well Completion Report Part I and it appears that a properly constructed well cannot be installed in the borehole, we may require the well to be properly abandoned and permanently sealed, in accordance with Part 3 of the HWCPIS, and pursuant to the State Water Code (HRS § 174C-95) and HAR §13-168-16.

Mr. Marcus Frandsen Page 2 September 23, 2008

If we determine that the well construction is acceptable but that the pumping tests that have been done are not representative of the target aquifer, additional testing that discretely tests the bottom 40 feet of the borehole may be required. This could be accomplished by placing an inflatable packer or other appropriate means inflated packer or other means to isolate the bottom 40 feet of the borehole may help resolve this issue.

Please remember that until our questions about this well are addressed, we cannot issue the certificate of well construction completion, which transfers responsibility of <u>all</u> aspects of well usage and maintenance from the drilling/pump installation contractor to the landowner and/or well operator. As you know, this well cannot be pumped for purposes other than well and aquifer testing (where well and aquifer tests are as defined in the HWCPIS) until the well construction and pump installation completion certificates have been issued. Use of water from this well before these certificates have been issued is a violation of your permit conditions. Because you are the permittee, you will be held responsible for any pumpage violations on the subject property.

Please remember that your well construction and pump installation permits expired on May 25, 2008. No further work should be done on this well without a valid signed permit. If we determine that the well should be properly abandoned and permanently sealed, you will be required to obtain a well abandonment permit from the Commission before performing this work.

Failure to deliver your video record for Well No. 0419-05 within 60 days as requested above, performing any well work without a valid Commission permit, and failure to adhere to your permit conditions are violations that could result in fines of up to \$5,000 per day.

As you know, we are holding 13 of your well construction/pump installation completion applications for processing. You must address this and any other unfinished business matters we have communicated to you before we will process any of these applications. However, we are prepared, if necessary, to expedite processing of a well abandonment permit application for Well No. 0419-05 to resolve the matters outlined above. If we determine that additional well or aquifer testing is required for this well, you must obtain an additional permit prior to performing this work; this testing could be allowed as a condition of a pump installation permit if the well is deemed acceptable, based on our review of the video record.

Please be aware that we are also prepared to expedite processing of a <u>complete</u> well construction application for the work required to correct the well construction violation at Well No. 0321-02 (Allen Well), as we have discussed. As a reminder, if you are planning to perform this work in November, you must submit your well construction application very soon to allow time for processing and issuance of the required permit. The usual processing time is ninety (90) days from the date we receive a complete application.

If you have any questions or if you wish to discuss these matters with our staff, please call Denise Mills at (

Sincerely,

KEN C. KAWAHARA, P.E.

Deputy Director

DM:ss

c: Greg Allen



State of Hawaii

COMMISSION ON WATER RESOURCE MANAGEMENT Department of Land and Natural Resources

WELL COMPLETION REPORT - PART I

Well Construction

instructions: Please print in ink or type and send completed report (with attachments, if applicable) to the Commission on Water Resource Management, not accept incomplete reports. This form shall be submitted within 60 days of the completion of work. For assistance, please consult the Hawaii Well Construction and Pump Installation Standards or call the Regulation Branch at For updates to this form or additional information, please visit our website at http://www.state.hi.us/dinr/cwm/

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| 1. State Well No.: 04/9-05 Well Name: Kapaa High Lamb # 1 Island: Kauai 2. Address: Kapaa Idigh Lamb Kauai Tax Map Key: 4-3-03:001 3. Drilling Company: Oigh Plamb Oxilling 4. Drilling method used during contruction: Rotary Percussion Other (describe) 5. Date Well Construction (drilled, cased, grouted) completed: 11-06 Fill out attached Driller's Log In addition to the driller's log, if a geologic log was prepared, please stromit with this form. 6. Was the subject well cored? Pes X No |
| 7. Step-Drawdown Test completed? Yes Attach Step-Drawdown Test form (12/17/97 SDPTD Form) |
| 8. Constant Rate Aquifer Test completed? No Yes Attach Constant Rate Aquifer Test form (12/17/97 CRPTD Form) |
| Initial parameters: 9. Water-level: 10. Chloride: 53 MG/L portition Date and time of measurement: 11. Temperature: 12. Fill in the as-built section on the other side of this sheet. 13. Attach photograph of well and concrete pad showing benchmark on concrete pad. 14. Fill in attached surveyor's report. 15. If a pump is not planned to be installed, please describe (below in the remarks section) how well is secured to prevent unauthorized access (example: lockable cover, threaded coupling, etc.) 16. Remarks: Y h plate welled on the first above ms! Date and time of measurement: D-19 - M - NOON month/day/year time |
| |
| Licensed Driller (print) Marchs Frances C-57 Lic. No. 22-701 Signature March Frances Date 2-11-07 |

| , 13. | . AS-BUILT CLL SECT | | It if different an diagram provided below) |
|----------------------------|----------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| , | 27 | Hole Diameter: | 16 in. |
| Elevation a (to nearest | at top of casing <u>27</u> ft., msl* t 0.01 ft.) | Minim | um of 2' Radius & 4" Thick Concrete Pad |
| ` <u> </u> | | 9.2 | _ Ground Elevation: 25. _ft., msl |
| Bench mark elevation: | | | 1 ///// |
| A | | | Please refer to the |
| Survey to nearest | Cement Grout: 85 ft. | | HAWAII WELL CONSTRUCTION AN PUMP INSTALLATION STANDARDS |
| 0.01 ft.) | (min. 70% of distance from | 3 | to ensure that your as-built is in compliance |
| | ground elevation to top of water surface or 500 ft., | | with applicable standards. |
| | whichever is less.) | 6 6 6 | |
| L | | - Water Level Elev) | Solid Casing: (≥ 90% x (Groupd ElevWater Level Elev |
| | Annular space between | Wat | *Length:ft. Nominal Diameter: ft. |
| | hole and casing (min.3"): | | Nominal Diameter: 7 8 in |
| | 3 in. | E E C | Wall Thickness:in |
| | | i E | Bottom Elevation: - 40 y ft., msl |
| | Rock or Gravel Packing: | | |
| Total Depth | 1 - 1 | | |
| 260 ft. | N/A ft. | | Open Casing: ☐ Perforated ☐ Screen |
| 2.00 n. | ☐ Crushed Basalt | | Length: NONE ft. |
| | ☐ Rounded Gravel | | Nominal Diameter:in. |
| | | V S | Wall Thickness:in. |
| | Water Leyel Elevation: | | Bottom Elevation: ft., msl |
| | #14 ft. msl* | | Bottom Lievation. |
| | <u> </u> | | |
| | | | Open Hole: |
| | | | Length: 192 ft. Diameter: 8 in. Bottom Elevation: 234 ft., msl |
| | | | Diameter: 8 in |
| <u> </u> | · · · · · · · · · · · · · · · · · · · | | Bottom Flevation: 234 ft msl |
| | *msi = mean sea level | | |
| | ilisi – ilicali sca icvei | | |
| Solid Casing Materi | al: | · | |
| | — with (check one or more): □ AN | SI/AWWA C200 🗆 API S | pec. 5L XASTM A53 □ ASTM A139 |
| And compliant with | (check one or more): AST | M A242 🗆 Type E | Type S G rade B □ Other |
| Stainless Steel: (check or | · · | M A409 (production wells) | □ ASTM A312 (monitor wells) |
| | o ASTM F480 and ASTM D1527 | • | edule 40 |
| • | o ASTM F480 and (ASTM D178 | , , | • |
| Thermoset Plastic: (chec | , | d Resin Pipe conforming to a ast Resin Pipe conforming to | |
| | | stic Mortar Pressure Pipe co | |
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| Open Casing Materi | | | |
| | with (check one or more): □ AN | | |
| | (check one or more): AST | •• | Type S Grade B Other |
| Stainless Steel: (check or | • | M A409 (production wells) | , |
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| | | stic Mortar Pressure Pipe co | |
| | | • | e conforming to AWWA C950 |
| | □ PTFE Fluoroca | rbon Tubing conforming to A | STM D3296 |
| | □ FEP Fluorocar | on Tubing conforming to AS | TM D3296 |

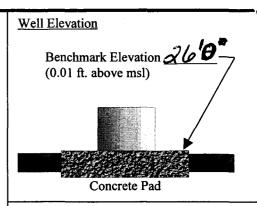
* Amended pertelephone conversation w/ shook Luellen 8/29/0008/1 Form 9/12/01 Page 2 of 4

DRILLER'S LOG

WELL NUMBER: 0419-05

| Depths (ft.) | Rock Description, Water Level, etc. | Dates | Depths (ft.) | Rock Description, Water Level, etc | . Dates |
|--------------|-------------------------------------|---------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| | Drown shale | 7-28-06 | 206 to 208 | brown clay | 8-26-06 |
| | red thick clay | | | | |
| | black lava | | | | |
| 15 to 36 | brown clay | 7-30-06 | 233 to 240 | cinder | 8-27-06 |
| 36 to 49 | black lava | 7-30-06 | 240 to 260 | broken lava | 9-28-06 |
| 4/9 to 103 | brown hard clay | 8-11-06 | to | | |
| | blacklava | 8-11-06 | to | - | |
| 113 to 122 | red clay | 8-11-06 | | | |
| | black lava | 8-11-06 | to | - | |
| 132 to 133 | brown clay | 8.1106 | to | - | |
| | black lava | 8-11-06 | | - | |
| 146 to 148 | brown clay | 8-11-06 | to | · Annual | |
| | basalt | 8-11-06 | to | | - <u></u> |
| | basalt | 8-16-06 | to | | <u> </u> |
| 165 to 187 | had brown clay | 8-18-06 | to | | |
| 187 to 200 | black lava | 8-18-04 | to | <u> </u> | |
| 200 to 200 | l'apalt | 8-19-06 | to | | R R C |
| to | | | to | | CEIVED |
| | | | | ON WATER | VED: |
| Remarks: | | | | | -2 |
| Condi | | . • | | • | - |
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N 22° 04,488 W 159° 19 927



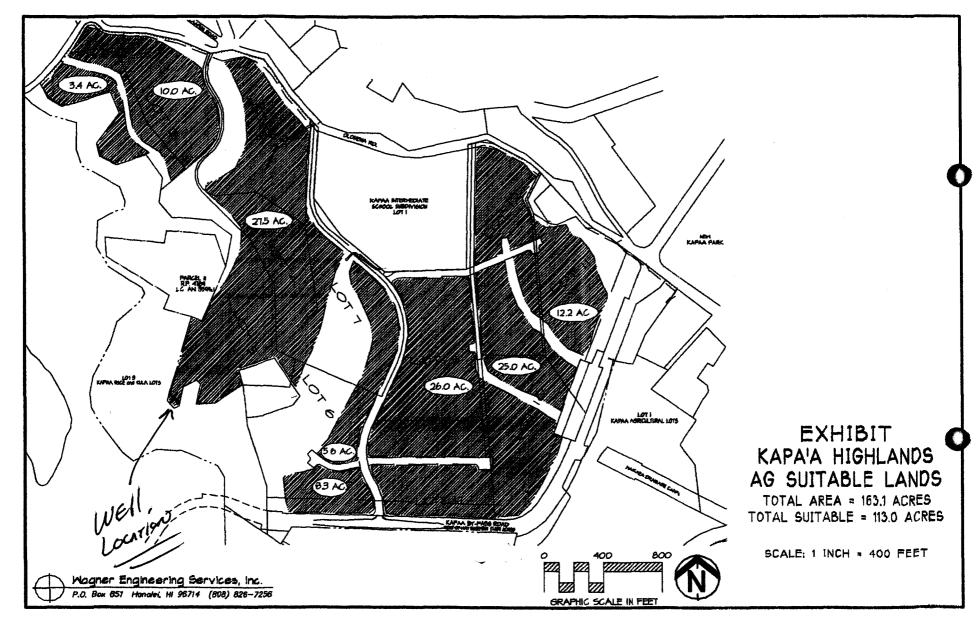
Benchmark reference control point

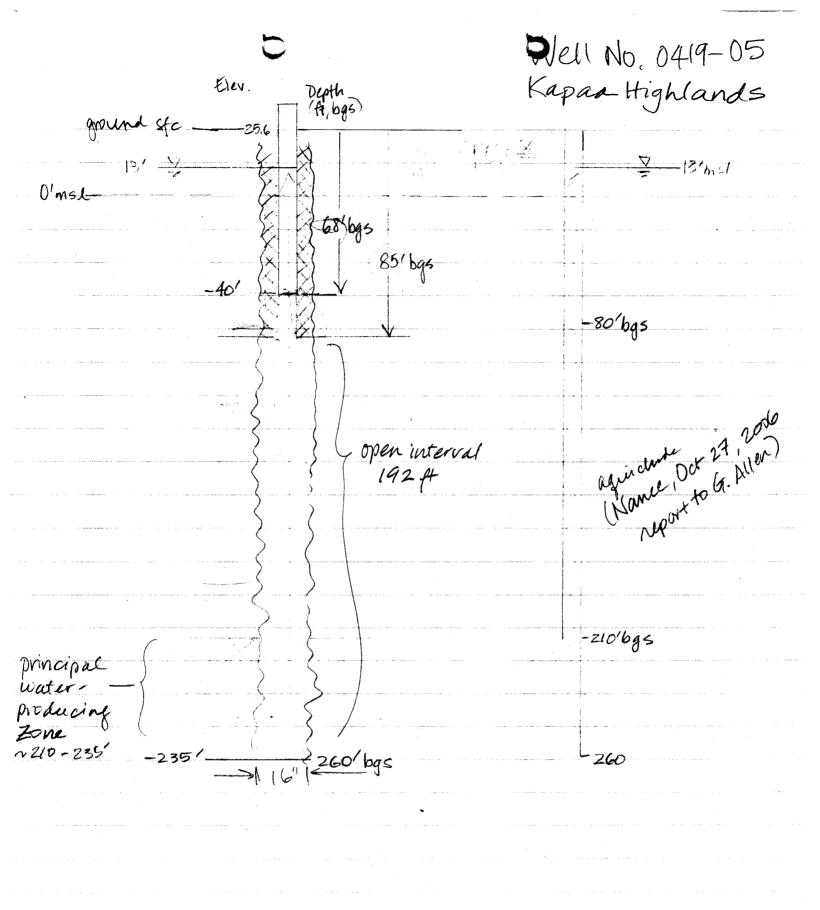
Surveyor's stamp and signature

PLOT PLAN - SEE ATTACHED

(Provide Latitude and Longitude of well referenced to NAD27 to nearest second)

MAD 83





modified 8/29/08
per 40000 w/ L/401/en



"GAllen"

02/02/2007 04:37 PM

To <lenore.y.nakama

CC

bcc

Subject Emailing: well picture 3, well picture 2, well picture 1

2-0419-05

Aloha Lenore, Can you e-mail me or fax what Marcus with high planes well drilling submitted for the Kapaa Highlands well. Tom Nance will help address the outstanding issues. Is the bench mark welded on the well pipe adequate or should we transfer it to the pad?

well picture 3

well picture 2

well picture 1

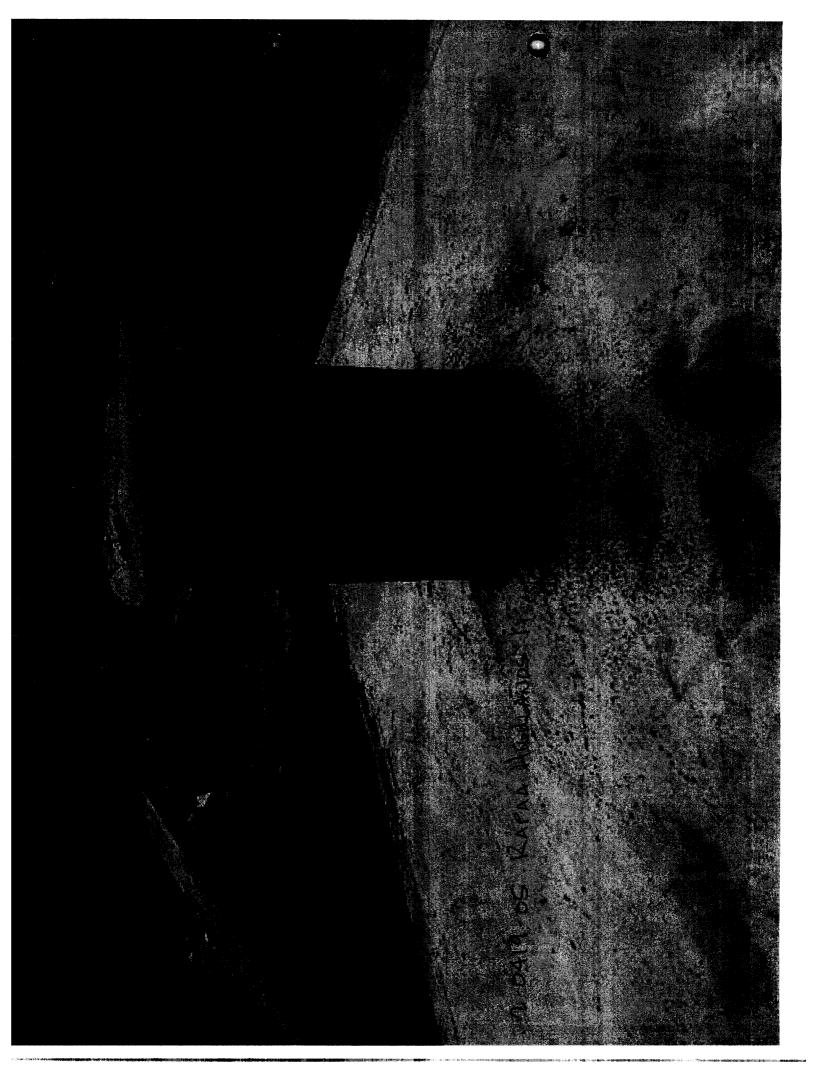
Note: To protect against computer viruses, e-mail programs may prevent sending or receiving certain types of file attachments. Check your e-mail security settings to determine how attachments are handled.

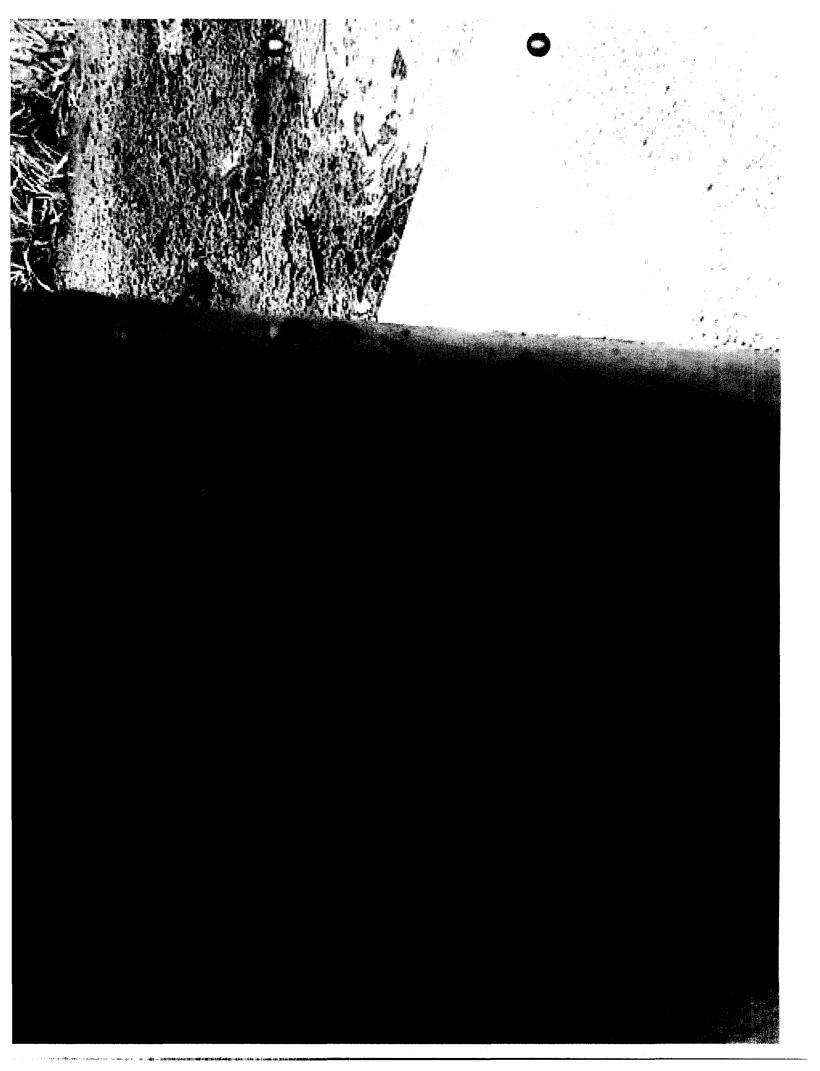




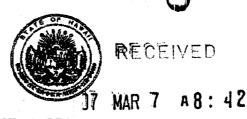


well picture 3.jpg well picture 2.jpg well picture 1.jpg





LINDA LINGLE



PETER T. YOUNG

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIKE, N.D., J.D. STEPHANIE A. WMALEN

DEAN A. NAKANO

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

COMMISSION ON WATER RESOURCES

PRESCURCE MANAGEMENT ATER

PRESCURCE MANAGEMENT ATER

PRESCURCES

January 2, 2007

0419-05.wcrI

Mr. Marcus Frandsen
Valley Well Drilling High Plains Only in

Dear Mr. Frandsen:

Well Completion Report Part I for Well No. 0419-05

We have received your Well Completion Report Part I for the Kapaa Highlands Well #1 (Well No. 0419-05). However, matters which must be addressed before we can accept your report as complete are as follows:

- 1. Please submit the first page of the subject report. We have attached a copy for your convenience. Please note that the most current version of the form is dated January 17, 2005, and for all future filings, the most current version should be used pursuant to Condition 8 of your permit.
- 2. Please submit a photograph of the well and concrete pad showing the benchmark on the concrete pad. Bug allan E-mail already
- 3. The elevations given in your as-built sectional drawing show that the bottom elevation of the well exceeds the ¼ aquifer thickness limitation, which is not in compliance with Section 2.2 of the Hawaii Well Construction and Pump Installation Standards (2004), which states: Dee attached pages—

"Except for salt-water wells, any well constructed in basal aquifers for the purpose of nonpotable or potable water withdrawal shall be initially designed and pump tested at a depth below sea level not exceeding one-fourth of the theoretical thickness (41 times the head) of the basal ground-water body, unless authorized by the Chairperson. Upon request by the permittee and submission of the supporting data and analysis, the Chairperson may allow deepening and subsequent testing of such wells to a depth below sea level not exceeding one-half of the theoretical thickness of the basal ground-water body."

Please provide your reason(s) why the depth limitation was exceeded and why prior approval was not obtained in advance.

0419-04 = 60gpm 0419-06≈1000 1 away 0419-07 = 2000 away

0419-05 to 0419-08.

4. Please submit the required aquifer tests to support the proposed installation of a 100 gpm capacity pump in the well.

Until these matters are addressed, we cannot issue the certificate(s) of well construction completion and/or pump installation completion that transfer(s) responsibility of all aspects of well usage and maintenance to the well operator/landowner. Please remember that the well may not be pumped for purposes other than well and aquifer testing until the certificates of 1) well construction completion and 2) pump installation completion have been issued, otherwise such pumpage would constitute a violation of the permit conditions. Since the permit is issued to the contractor, the contractor will be responsible for any non-testing pumpage violations when the certificates of completion have not been issued (where pumping tests are as defined in the Hawaii Well Construction and Pump Installation Standards). Please respond to the above item(s) within thirty (30) days of this letter's date. Failure to do so may result in fines of up to \$5,000 per day.

If you have any questions, please contact Lenore Nakama of the Commission staff at

Sincerely.

DEAN A. NAKANO Acting Deputy Director

LN:ss

Attachment



State of Hawaii

COMMISSION ON WATER RESOURCE MANAGEMENT Department of Land and Natural Resources

WELL COMPLETION REPORT - PART I

Well Construction

Instructions: Please print in ink or type and send completed report (with attachments, if applicable) to the Commission on Water Resource Management, not accept incomplete reports. This form shall be submitted within 60 days of the completion of work. For assistance, please consult the Hawaii Well Construction and Pump Installation Standards or call the Regulation Branch at 5 For updates to this form or additional information, please visit our website at http://www.state.bi.us/dint/owrm/

For Official Use Only:

808-821-9636

| mp. www.sale.masamine |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. State Well No.: 04/9-05 Well Name: Kapaa high Lamb # 1 Island: Kauai 2. Address: Kapaa laigh Lamb Kauai Tax Map Key: 4-3-03:001 3. Drilling Company: Oligh Plamb Onling 4. Drilling method used during contruction: Rotary □ Percussion □ Other (describe) 5. Date Well Construction (drilled, cased, grouted) completed: 11-06 Fill out attached Driller's Log In addition to the driller's log, if a geologic log was prepared, please stromit with this form. 6. Was the subject well cored? □ Yes ▼ No |
| 7. Step-Drawdown Test completed? Yes Attach Step-Drawdown Test form (12/17/97 SDPTD Form) |
| 8. Constant Rate Aquifer Test completed? No Yes Attach Constant Rate Aquifer Test form (12/17/97 CRPTD Form) |
| Initial parameters: 9. Water-level: 10. Chloride: 11. Temperature: 12. Fill in the as-built section on the other side of this sheet. 13. Attach photograph of well and concrete pad showing benchmark on concrete pad. 14. Fill in attached surveyor's report. 15. If a pump is not planned to be installed, please describe (below in the remarks section) how well is secured to prevent unauthorized access (example: lockable cover, threaded coupling, etc.) 16. Remarks: 17. Putte welled on they are time more pad and time of measurement: 18. Attach photograph of well and concrete pad showing benchmark on concrete pad. 19. If a pump is not planned to be installed, please describe (below in the remarks section) how well is secured to prevent unauthorized access (example: lockable cover, threaded coupling, etc.) |
| |
| Licensed Driller (print) Marcys Frances C-57 Lic. No. 22-701 Signature Marcys Frances Date 2-11-07 |

+ 25 - 25 - 2001 14:33 FROM: DLNR 808 587 0219 P.2/4 n diagram provided below) 13. AS-BUILT "LL SECTION (Please attach as-built if different Hole Diameter: 16 in. Elevation at top of casing 27_ft., msl*_ Minimum of 2' Radius & 4" Thick Concrete Pad (to nearest 0.01 fl.) _ Ground Elevation: 25-4 ft., msi Bench mark elevation-Please refer to the HAWA!! WELL CONSTRUCTION AND 26 ft. mst PUMP INSTALLATION STANDAROS Coment Grout: 85 (Survey to nearest (min. 70% of distance from to ensure that your as-built is in compliance 0.01 (2.) ground alevation to top of with applicable standards. water surface or 500 ft. whichever is less.) Solid Casing: (> 90% x (Ground Elev. Mater Level Elev)) Annular space between hole and casing imin.3"): Nominal Dismeter Elex. Wall Thickness: in (Ground I Bottom Elevation: ft., msi Rock or Gravel Facking: Total Depth Open Casing: □ Screen 260 R Length: rt Crushed Basalt ☐ Rounded Gravel Nominal Dismeter: Wall Thickness: in. Water Level Elevation: Bottom Elevation: ft., mal Open Hole: Longth: īn. Diamater: Bottom Elevation: ft , msi "msi = mean sea level 2.0419-05 KAPAA KIBHLANDS Solid Casing Material: Carbon Steel: compliant with (check one or more): I ANSHAWWA C200 I API Spec. 5L Type E Type S And compliant with (check one or more):

□ ASTM A242 ☐ ASTM A409 (production wells) D ASTM A312 (monitor wells) Stainless Steel: (check one): ் பெடை ஏன்னாள்தாக ASTM F480 and ASTM D1527: (check one) ☐ Schedule 80 5 Schedule 40 포션을 Plastic conforming to ASTM F460 and (ASTM D1785 or ASTM D2241): (check one): 다 Schedule 40 다 Schedule 60 다 Schedule 120 D Filament Wound Resin Pipe conforming to ASTM 02996 Thermosel Plastic: (check one) L Daniel Lightly Cast Resin Pipe conforming to ASTN 02007 in Reinforced Plastic Morter Pressure Pipe comparing to Maria 2021 El Glass Fiber Reinforced Roam Process: Pipe conforming to AMAYA CRES in PTRE Flaggeren Tuting winforthis to ASTM Discusand the state of t Open Casing Materials T ASTM ASS CLUB Lis Threst compliant with foliatik and or maray. C ANSURVIVALA COCC. TO ART Spec. SL O ASTM A139 The state of the s D ASTM A312 imonitor wells: C ASTM A409 (production wells) Stabilities Steelt (check tide) Assis Flustic variety is ACTM 5320 and ASTM 03577 (check one) i) Schedule 56 g Schedule 40 A Schedule 40 | D Schedule 40 D Filament Wound Resin Pipe conforming to Active 22900 Thermoset Plastic: (check one)

B Centrifugally Cast Resia Pipe conforming to ASTM 02597

DEFECTION m FFP Fluorecarbon Tubing conforming to ASTM D3298

O Reinforced Plantic Mortal Pleasure Pipe combining to ASTM 03517 m Otees Piner Heinforced Rasin Pressure Pipe confunding to ANYTH COUR

9.29-08 (EL CON. MONTOUR SIZOITAGEZUIA W | SHOOK LIEUX



No. of pages: § Email: gallen@harbormall.net

Original will will not be mailed to you.

04101-05

October 27, 2006 06-281 (05-41)

MEMORANDUM

TO:

Greg Allen

FROM:

Tom Nance

SUBJECT:

Irrigation Supply for the Kapaa Highlands Agricultural Subdivision

Introduction

This memo report assesses the feasibility of developing an onsite well (or wells) to provide the necessary irrigation supply for the Kapaa Highlands Agricultural Subdivision. The total area of the project is 163 acres. Wagner Engineering Services, Inc. has determined that up to 113 acres of the site is sultable for agricultural use (Figure 1). The Kauai Department of Water (DOW) standards require an average supply for irrigation for 2500 GPD/acre. For 113 acres, this translates to a year-round average of 0.283 MGD. Applying a maximum seasonal use factor of 1.5 results in a required summertime supply capability of 0.424 MGD (equivalent to 295 GPM operating continuously).

Results of an Onsite Exploratory Borehole

To investigate the possibility of providing the irrigation supply with an onsite well or wells, an exploratory borehole was drilled and pump tested. The location of this exploratory borehole is shown on Figures 1 and 2. Ground elevation at the well site is 25 feet. It was drilled to a depth of 260 feet or 235 feet below sea level. During the course of drilling, two separate aquifers were encountered. The upper aquifer has a static water level of about 19 feet above sea level (MSL) and it extends to a depth of about 80 feet (ie. to 55 feet below sea level). It has very limited yield (less than 30 GPM) as it is essentially a collection of water in the soil mantle perched on poorly permeable Koloa lavas beneath it.

The strata between 80- and 210-foot depth are poorly permeable and function as an aquiclude separating the upper and lower aquifers. The lower aquifer, which starts at 210-foot depth and extends below the 260-foot depth of the exploratory borehole, has a static water level about 13 feet (MSL). This lower aquifer is quite productive.

A pump test was run at my direction to define the potential yield and quality of water from the lower aquifer. Using a combination of casing and grout, water from the upper aquifer was sealed off for this test. Results of the 12-hour test conducted on October 19, 2006 are presented on Figures 3, 4, and 5. A series of flowrate steps were run initially to define hydraulic performance (Figure 3). Using a curve

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Memo to: Greg Allen October 27, 2006 -- 06-281

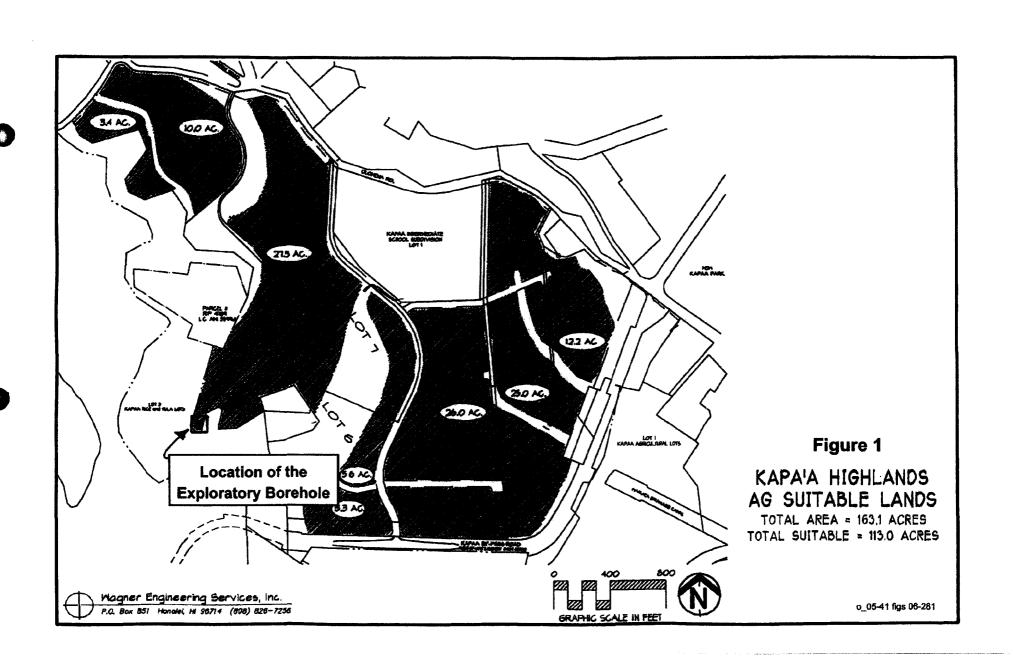
Page 2

The remainder of the 12-hour test was run at 550 GPM to see if any salinity change would occur. These results are shown on Figure 5 and Table 1. The salinity (as measured by conductivity) actually decreased for the first two hours and stabilized after that. Chlorides of just 53 MG/L demonstrate that the water is quite fresh and obviously suitable for irrigation use.

Conclusions and Recommendations Regarding the Irrigation Supply

- Results of the exploratory borehole demonstrate that an adequate irrigation supply for the Agricultural Subdivision can be developed from a single onsite well located in the near proximity of the exploratory borehole.
- (2.) The finished dimensions of the production well should be based on the following:
 - a. A 17-inch borehole should be drilled to 300-foot depth.
 - (b) 220 feet of 8-inch solid casing and 80 feet of 8-inch perforated casing should be installed in the borehole.
 - The annular space from 220 feet to the ground surface should be sealed with cement grout.
 - Final pump testing at rates up to 550 GPM should be conducted to confirm the well's yield.
- 3. A companion report by ITC Water Management describes the delivery components of the irrigation system based on the following:
 - A 7.5 horsepower, 450 GPM submersible pump and motor should be installed in the well at a depth of 30 to 40 feet.
 - b. The well pump should deliver water to an adjacent storage tank of at least 30,000 gallons in size. Well pump cycles would be controlled by a level switch in the tank.
 - c. An on-demand pump station of up to 600 GPM capacity should be installed next to the tank to draw water from the tank and deliver it to users in the agricultural subdivision.

Attachments



Specific Conductance and Chlorides of Samples Collected During the 12-Hour Pump Test on October 19, 2006

| Sample Time | Pumping Rate (GPM) | Specific Conductance (μS/cm @ 25° C.) | Chlorides (MG/L) |
|-------------|-------------------------|--------------------------------------------|-----------------------|
| 10:05 | 317 | 468 | 55 |
| 10:30 | 317 | 449 | 54 |
| 11:00 | 438 | 440 | 54 |
| 11:30 | 529 | 436 | 53 |
| 12:00 | 528 | 432 | 53 |
| 13:00 | 527 | 430 | 53 |
| 14:00 | 527 | 429 | 53 |
| 15:00 | 527 | 429 | 53 |
| 16:00 | 528 | 429 | 53 |
| 17:00 | 529 | 428 | 53 |
| 18:00 | 531 | 429 | 53 |
| 19:00 | 532 | 430 | 53 |
| 20:00 | 533 | 431 | 53 |
| 21:00 | 533 | 431 | 53 |
| 22:00 | 533 | 431 | 53 |

- Notes: 1. Specific conductance measured in the TNWRE office using a HACH Sension5 meter calibrated with a 12.88 mS/cm standard.
 - 2. Chlorides determined by mercuric nitrate titration in the TNWRE office. Samples were diluted 10 fold.

Figure 4. Hydraulic Performance of the Well Based on Step Test Data

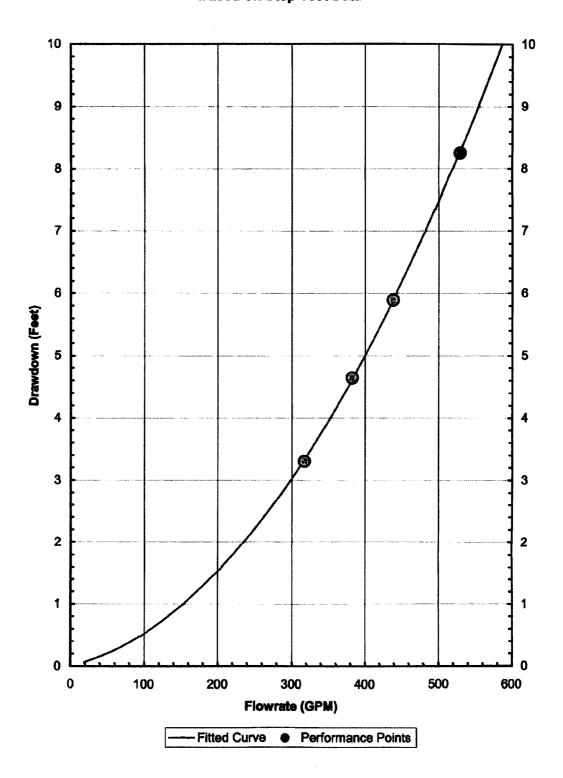
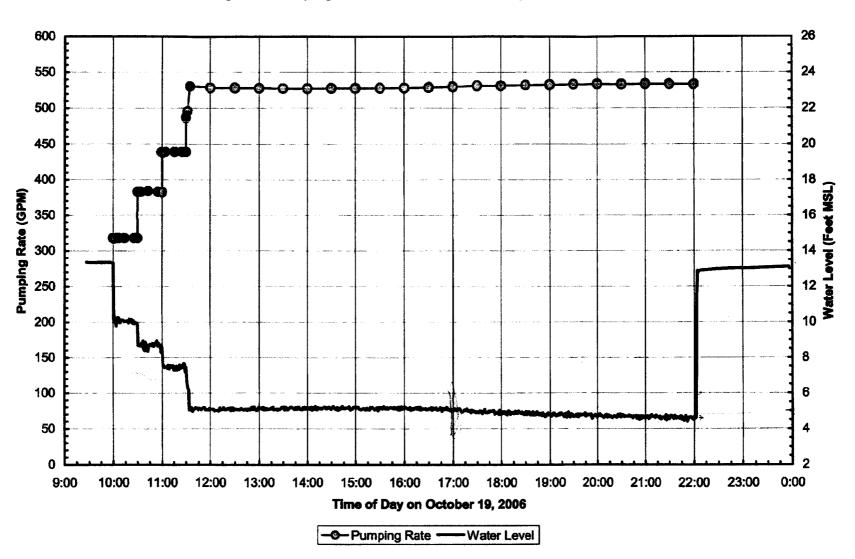


Figure 3. Pumping Rate and Water Level During the 12-Hour Test





MEMORANDUM

From: Denise Mills 78

Date: September 18, 2008

To: File

Subject: Well No. 0419-05 – Well construction issues

I spoke with Tom Nance on the phone in September 17, 2008 about the well completion details, as a follow-up to my conversation with Shook Luellen, representing Marcus Frandsen of High Plains Drilling. I asked about the video survey Shook said Tom Nance had done on the well. Tom asserts that he had nothing to do with how the well was constructed and didn't do the video survey. He said that Marcus Frandsen had the survey done; Nance doesn't have the video record.

Tom also explained that he was asked to evaluate the well (or wellbore) conditions after the well was constructed. He was asked to do the pumping test and make recommendations for drilling and construction of the other supply wells planned for the project. His report, prepared for Greg Allen and dated October 27, 2006, is the result of his work.

He asserts that the term "exploratory boring" was used by Marcus Frandsen, and wasn't a result of his work on the project. Tom gave some advice as to how to complete the well, if the boring was to be converted for use as a water supply well for the project and says that "Marcus didn't listen" to him or do what he advised, but proceeded on his own. Tom told me that his opinion is that the well should be filled with concrete and permanently sealed and then, if a supply well is still needed for the project, a new well be drilled and properly constructed. Tom's opinion is that the well as currently constructed is not suitable for use as a water supply well and does not comply with the Hawaii Well Construction & Pump Installation Standards.



MEMORANDUM

Date: September 18, 2008

From: Denise Mills M

To: File

Subject: Well No. 0419-05, Amendments to WCR1

I received a call from Shook Luellen, for High Plains Drilling, on August 29, 2008. He was responding to questions and issues concerning the Well Completion Report Part I for the subject well. Matters covered are as follows:

- Shook said that the correct solid casing depth is 86 feet bgs. He said they have a video survey record that confirmed this casing depth. (Said Tom Nance did the survey; however, in a telephone conversation with Tom Nance on September 17, 2008, Nance asserts that Marcus Frandsen had the survey done.)
- Shook said that HPD has drilled only one borehole for Kapaa Highlands and it was constructed for use as a water supply well. The original plan was for four supply wells, but this borehole produced more water than expected and is sufficient to supply their projected needs. Greg Allen (owner representative) made the decision to convert the exploratory boring (as described in a report by Tom Nance) to a water supply well.

LINDA LINGLE



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

August 26, 2008

LAURA H. THIELEN

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. DONNA FAY K. KIYOSAKI, P.E. LAWRENCE H. MIIKE. M.D. J.D.

KEN C. KAWAHARA, P.E.

0419-05 info req

Mr. Marcus Fransden High Plains Drilling



Dear Mr. Fransden:

Request for Information Kapaa Highlands Well 1 (Well No. 0419-05)

Following your telephone conversation with our staff on August 14, 2008, and in our continued effort to resolve matters relating to Well No. 0419-05 (Kapaa Highlands Well 1), we have reviewed the information provided by Tom Nance, of Tom Nance Water Resource Engineering, in a memorandum to Greg Allen, dated October 27, 2006.

While some of the information in this memorandum is useful and helps answer our question regarding the well depth, several other questions remain. These matters were previously addressed in our June 12, 2007, letter requesting information required to complete Well Completion Report Part I. You have not responded to all of the issues raised in our June 12, 2007 letter. Consequently, we are not able to accept your report as complete until we receive information to document that well construction and testing were done in accordance with the *Hawaii Well Construction & Pump Installation Standards* (HWCPIS) (2004). A copy of our June 12, 2007, letter is attached for your reference.

Matters that remain unresolved concern the exploratory borehole described in Nance's memorandum, the construction details for Well No. 0419-05, and whether the pumping tests that were done are representative of the aquifer targeted for production. To help resolve these matters, please respond to the following questions:

- 1. The borehole and well described on your Well Completion Report Part I appear to have the same specifications as the exploratory borehole described in Tom Nance's memorandum. Based on the information available to us, we conclude that the exploratory borehole described in Nance's memorandum was constructed and completed as Kapaa Highlands Well 1 (Well No. 0419-05).
 - a. Please tell us if you constructed and tested only Well No. 0419-05, or if you drilled and constructed a second exploratory borehole for testing purposes.

- b. Please provide the latitude and longitude (NAD 83) of the exploratory borehole, or its location relative to Well No. 0419-05. What is the status of the borehole?
- 2. The well construction details shown on your Well Completion Report Part I and the information provided in Tom Nance's memo raise several questions and concerns about how the well is constructed. Please explain the following details shown on your report:
 - a. The solid casing length is reported as 68 feet below ground surface (ft bgs) and the grout is reported to extend to 85 ft bgs. Please explain how the well is sealed between 68 ft and 85 ft bgs. The casing and grout dimensions should be verified.
 - b. Tom Nance describes an upper aquifer that extends to approximately 80 ft bgs. To comply with the HWCPIS (Section 24©), the well should have been constructed with solid casing through the entire upper aquifer and extended into the top of the confining strata to prevent leakage and/or commingling of water from the different water-bearing zones penetrated by the well bore. Please explain your rationale for placing the solid casing to only 68 ft bgs.
 - c. Underlying the upper aquifer, according to Nance, are "poorly permeable strata" between 80 ft and 210 ft bgs that "function as an aquiclude separating the upper and lower aquifers." (See Nance memo, page 1.) Some of the materials described on the driller's log suggest that there may be layers of more permeable material between 80 ft and 210 ft bgs that could conduct water to the borehole. Your well diagram shows that the 16-inch-diameter borehole is open from the bottom of the solid casing (68 ft bgs) to the bottom of the hole (260 ft bgs), over a total length of 192 ft.

The length of open hole poses a significant potential for leakage to occur into overlying or underlying formations and commingling of ground waters from different formations. Consequently, the well construction does not comply with the minimum casing requirements or minimum annular seal (grouting) requirements specified in the HWCPIS. Please explain your rationale for not casing or grouting the borehole between 80 and 210 ft bgs.

3. Nance's memorandum describes hydraulic testing of an exploratory borehole, which we have concluded is the same borehole represented by your Well Completion Report Part I for Well No. 0419-05. Please tell us if the hydraulic testing described in Nance's report was done on the well described in your Well Completion Report Part I, or if it was done on a separate exploratory borehole.

If the testing was done on a separate borehole, we cannot accept the results as a proxy for the required well data. Also, the testing did not conform with the procedures given in the HWCPIS, which requires full recovery after the step-drawdown test before running the constant-rate pumping test. If testing was done on Well No. 0419-05, please provide the following information.

a. Documentation and analyses necessary to show that the pumping test results represent the lower confined aquifer only, extending from approximately 210 ft to 260 ft bgs. In other words, what evidence is available to show that none of the strata between 80 ft and 210 ft bgs did not contribute any flow to the well during pumping?

Mr. Marcus Fransden Page 3 August 26, 2008

b. The memo from Nance gave recommendations on "the finished dimensions of the production well," which include a recommendation for "final pump testing...to confirm the well's yield." The recommended well construction is somewhat different from that detailed on your Well Completion Report Part I. Please explain if the "production well" referred to in this recommendation is Well No. 0419-05. Please explain whether the recommended "final pump testing" has been completed. If so, please provide the data from that final test.

Please remember that the well cannot be pumped for any purpose other than well and aquifer testing until the Commission has issued certificates of: (1) well construction completion and (2) pump installation completion for each well. Use of water from this well (for any purpose other than testing) without a certificate of pump installation completion is a violation of the State Water Code (Chapter 174C, HRS) and is subject to fines of up to \$5,000 per day.

Please respond to this letter within 30 days of receipt to clarify the status of the subject wells. If you have any questions, please contact Denise Mills of the Commission staff at

Sincerely

KEN C. KAWAHARA, P.E.

Deputy Director

DM:ss Enclosure

c: Greg Allen, Kapaa Highlands, LLC



Denise E Mills/DLNR 08/18/2008 03:29 PM

To liuellen8

Subject Fw: Well No. 0419-05 - Kapaa Highlands Well 5

Here are the attachments:

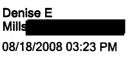


201

0419-05 WCR1 portion.pdf 0419-05 June 12 2007 kr.pdf

---- Forwarded by Denise E Mills/DLNR/StateHiUS on 08/18/2008 03:25 PM -----







Subject Well No. 0419-05 - Kapaa Highlands Well 5

Hi Shook,

I reviewed the October 27, 2006, memo from Tom Nance to Greg Allen regarding the exploratory borehole analysis he provided. While some of the information in the memo is useful and answers at least the question we had regarding the final well depth, our review raised other questions about well construction and the representativeness of the pumping test that was done.

We need more information before we can accept the Well Completion Report Part 1 for this well. Given the scope of additional information needed to resolve the outstanding matters with respect to Kapaa Highlands, I will follow this e-mail with a formal letter to Marcus that outlines these outstanding issues.

Our letter, dated June 12, 2007, identified these concerns and they remain unresolved. For your convenience, I have included a scanned copy of that letter for your reference, and pages 2 and 3 of your well completion report. Please answer the following questions:

- It appears that the borehole and well described on your Well Completion Report Part 1 is the same as the "exploratory borehole" described in the memo from Tom Nance. The borehole and depth details suggest that the "exploratory borehole" described by Nance is also designated Well No. 0419-05. Please tell us if you constructed and tested only this well, or if you also constructed an tested a second exploratory borehole as described by Nance.
- 2. The well construction details shown on your Well Completion Report and the information provided in Tom Nance's memo raise several questions and concerns about how the well is constructed. Please explain the following details shown on your report:
 - The solid casing length is reported as 68 ft below ground surface (bgs) and the grout is reported to extend to 85 ft bgs. Please explain how the well is sealed between 68 ft and 85 ft bgs. The casing and grout dimensions should be verified.
 - Your diagram shows that the 16-inch-diameter borehole is open from the bottom of the solid casing to the bottom of the hole, over a total length of 192 ft.
 - Tom Nance describes an upper ground water zone that extends to 80 ft bgs. To comply with the Hawaii Well Construction & Pump Installation Standards, the well should have been constructed with solid casing through the entire upper aquifer, and then extended into the top of the confining strata to prevent leakage and/or commingling of water from the different water-bearing zones. Please tell us your rationale for placing the solid casing to only 68 ft bgs.
 - Under the upper ground water zone, according to Nance's description, extending from 80

ft to 210 ft bgs, are "poorly permeable strata" that "function as an aquiclude separating the upper and lower aquifers." Some of the materials described on the driller's log suggest that there may be layers of more permeable material within the 80 to 210 ft depth range, that could conduct water to the borehole. Please tell us how the well construction, as shown on your report (open over 192 ft), prevents this flow from occurring and prevents commingling of waters from different water-bearing zones that may be tapped by the borehole.

- Please explain why the well was not constructed in compliance with the Hawaii Well Construction & Pump Installation Standards (2004).
- 3. Nance's report describes hydraulic testing of an <u>exploratory borehole</u>, which based on the information we have, appears to be the same as the well described on your Well Completion Report Part I. We need the following information to resolve questions about pumping test requirements for Well No. 0419-05:
 - Please tell us if the hydraulic testing described in Nance's report was done on the well
 described in your Well Completion Report Part I, or if it was in fact done on a separate
 exploratory borehole. If the testing was done on a separate borehole, we cannot accept
 the results as a proxy for the required well data. If the tests described by Nance were
 done on Well No. 0419-05, please provide the following information:
 - Please submit the raw field data collected during the pumping tests, not just the graphs.
 - The testing did not conform with the procedures given in the Hawaii Well
 Construction & Pump Installation Standards. The HWCPIS requires full recovery
 after the step-drawdown test before running the constant-rate pumping test.
 - Please explain how you know that the test results are representative of the lower confined aquifer only, extending from approximately 210 ft bgs to 260 ft bgs. In other words, what evidence do you have that none of the strata penetrated by well and open to the borehole did not contribute any flow during the pumping test?
- 4. The memo from Nance gave recommendations on "the finished dimensions of the production well," which include a recommendation for "final pump testing...to confirm the well's yield." The recommended well construction is somewhat different from that detailed on your Well Completion Report Part I.

Please call if you need clarification on any of these issues.

-Denise

Denise E. Mills HYDROLOGIST

Hawaii Department of Land and Natural Resources Commission on Water Resource Management

DRILLER'S LOG

WELL NUMBER: 0419-05

| Depths (ft.) | Rock Description, Water Level, etc. | Dates | Depths (ft.) | Rock Description, Water Level, etc. | Dates |
|--------------|-------------------------------------|---------|--------------|-------------------------------------|------------|
| | Down shale | 7-28-06 | 206 to 208 | brown clay | 8:26-06 |
| 10 to 14 | red thick clay | 7-28-06 | 208 to 220 | black lava | 9-26-06 |
| 14 to 15 | black lava | 7-28-06 | 220 to 233 | broken lava | 9-27-06 |
| 15 to 36 | brown clay | 7-30-06 | 233 to 240 | cinder | 8-22-06 |
| | black lava | | | broken lava | |
| 49 10 103 | brown hard clay | 8-11-06 | to | | |
| 103 to 113 | blacklava | 8-11-06 | to | | |
| 113 to 122 | red clay | 8-11-06 | to | | |
| 122 to 132 | black lava | 8-11-06 | to | | |
| 132 to 133 | brown clay | 8.1106 | to | | |
| 133 to 144 | black lava | 8-11-06 | to | | |
| 14/e to 148 | brown clay | 8-11-de | to | | |
| 148 to 163 | baselt | 8-11-06 | to | | |
| 163 to 169 | basalt | 8-16-06 | to | | |
| 165 to 187 | had brown clay | 5-19-06 | to | | |
| 187 to 200 | black lava | 8-18-06 | to | | |
| 200 to 200 | l'avalt | 8-19-06 | to | SOURCE SOURCE | |
| to | - | | to | | л <u>п</u> |
| | | | | AGEM | E D |
| Remarks: | | | | 聖男 | 2 |

Post-it Fax Note 7671 Date 2 - 5.01 # of pages A. Co. Ceal Read

| 13. AS-BU | ILT LL SECTION (Please attach as-built if different diagram provided below | v) |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Elevation at top of cas | Hole Diameter: 16 in. | |
| tievation at top of case (to nearest 0.01 ft.) | Minimum of 2' Radius & 4" Thick Concrete Pac | d |
| | Ground Elevation: 25.4 ft., msl | |
| ch mark vation: | 7740 | |
| 2_ ft., msi* | Please refer HAWAII WELL CONS | |
| vey to nearest Cement Gr | rout: 85 ft. PUMP INSTALLATIO | N STANDARDS |
| | of distance from vation to top of with applicable s | |
| water surfa | ace or 500 ft. | taricalus. |
| whichever i | s less.) | |
| | sce or 500 ft., s less.) Solid Casing: (≥ 90% x (Ground Elev | -Water Level Elev)) |
| | | π. |
| 3 | in. Nominal Diameter: | in. |
| | Wall Inickness: | |
| | Bottom Elevation: 40 V | π., msi |
| | Gravel Packing: | |
| Total Depth N/2 | in. Nominal Diameter: Wall Thickness: Bottom Elevation: Open Casing: Perforated | □ Screen |
| | ushed Basalt Length: NONE | |
| | unded Gravel Nominal Diameter: | in. |
| [] | | |
| Water t | Level Elevation: Wall Thickness: | |
| 1.0 | | |
| | | |
| | Open Hole: | |
| | Length: 192 | ft. |
| | Diameter: 8 | in. |
| | Bottom Elevation: 234 | ft., msl |
| *msl = r | mean sea level | |
| olid Coolean Matarials | • | |
| Solid Casing Material: | one or more): ANSI/AWWA C200 API Spec. 5L ASTM A53 ASTM. | A120 |
| And compliant with (check one | | Other |
| tainless Steel: (check one): | ☐ ASTM A409 (production wells) ☐ ASTM A312 (monitor wells) | |
| BS Plastic conforming to ASTM F4 | 80 and ASTM D1527: (check one) Schedule 40 Schedule 80 | |
| | · · · · · · · · · · · · · · · · · · · | 30 □ Schedule 120 |
| nermoset 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 | |
| oon Cooling Metavials A | 1/1 | |
| | CORP OF MORE): IT ANSWAMMA COOK IT ADI SPOS SI IT ASTRA ASS. IT ASTRA | A420 |
| And compliant with (check one | r oné or more): □ ANSI/AWWA C200 □ API Spec. 5L □ ASTM A53 □ ASTM. or more): □ ASTM A242 □ Type E □ Type S □ Grade B □ | A139 Other |
| tainless Steel: (check one): | □ ASTM A409 (production wells) □ ASTM A312 (monitor wells) | Odel |
| BS Plastic conforming to ASTM F4 | | |
| C Plastic conforming to ASTM F4 | 80 and (ASTM D1785 or ASTM D2241): (check one): Schedule 40 Schedule 8 | 30 🗆 Schedule 120 |
| nermoset 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 Regin Pressure Pipe conforming to AWWA C050 | |
| | □ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950 □ PTFE Fluorocarbon Tubing conforming to ASTM D3296 | |
| | □ FEP Fluorocarbon Tubing conforming to ASTM D3296 | |
| | | |

LINDA LINGLE



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

ALLAN A. SMITH

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D. STEPHANIE A. WHALEN

June 12, 2007

0419-05.wcr1a

Mr. Marcus Frandsen High Plains Drilling



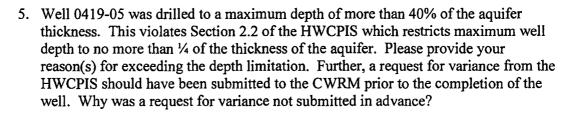
Dear Mr. Frandsen:

Well Completion Report Part I for Kapaa Highlands Well #1 (Well No. 0419-05)

Thank you for your response to our January 2, 2007 letter. Based on the information we have received so far, we have identified the following remaining issues with the subject report:

- Your response included a Memorandum from Tom Nance Water Resource
 Engineering documenting limited pump test information and a geologic assessment of
 subsurface conditions for an on-site exploratory borehole. However, no pump test
 information was provided for Well No. 0419-05. Please submit the raw pump test
 data for Well 0419-05.
- 2. Please be advised that per Section 2.9(c) of the Hawaii Well Construction & Pump Installation Standards (HWCPIS) the constant rate pump test should not be conducted until water levels in the well have completely recovered from the step-drawdown test. This regulation was not observed during the pump test conducted at the exploratory borehole, but must be complied with under the permit for Well Nos. 0419-05 to 08.
- 3. Please provide our office with the latitude and longitude (NAD 83) of the exploratory borehole. If this information is not available, the location of the exploratory borehole relative to wells 0419-05 through 0419-08 should be provided on a scaled map. What is the current status of the borehole?
- 4. If the exploratory borehole was drilled in the vicinity of Well 0419-05 and the subsurface conditions at the borehole can be assumed to reflect conditions at the well, then the well as constructed poses a significant potential for either contamination or waste, depending on head in the well. According to Section 2.4(c) of the HWCPIS solid casing should have been installed through the upper aquifer to the top of the confining layer to (1) prevent leakage into overlying or underlying formations and (2) to prevent the development of water from more than one aquifer. Why was the well not constructed according to these standards and in accordance with the recommendations in the Nance Memorandum?

Mr. Marcus Frandsen Page 2 June 12, 2007



6. For future pumping tests conducted at Wells 0419-05 and 0419-08, the CWRM requests that the impacts of pumping on the adjacent wells and stream be monitored. In particular, what is the approximate width and depth of water in the stream channel at the start and end of the tests? Are any changes in streamflow noted during the running of the tests?

In the case of already completed tests, if you happened to notice the presence or absence of water in the stream channel, or any changes to stream flow during testing, please provide this information to the CWRM.

7. Wells 0419-05 and 0419-08 are both located adjacent to a stream and marshy/wetland area. In order to better determine potential impacts to these sensitive habitats due to groundwater withdrawal, the CWRM requests that well 0419-05 be used as a monitoring well during pump testing of well 0419-08.

It appears that this well may be a substandard well. Depending on your responses to the above questions, we may recommend that the Commission require that this well be sealed.

If you have any questions, please contact Lenore Nakama of the Commission staff at

Sincerely,

W. ROY HARDY

Hydrologic Program Manager

LN:ss

RECEIVED

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08 JUL 30 A9: 07

Comm. On Water Resource Mangt.

APPROPRIEST NO POPPLIES OF A DISTRIBUTION OF A D

I am returning the completed WCR1 & 2 for the Ruddell well (1325-04) some bad math on my part made the well appear very deep, with the correct static water level things are in prespective. I took two more GPS reading with two separate instruments.

Concerning wells0321-02, 0419-05, and 1119-02: I am trying to come to some sort of agreement with owner concerning what I considered some poor decisions and influence from the job Hydrological consultant that have affected the projects and their outcome.

Please send me copies these WCR1 and problems therein.

Thank You

Marcus Frandsen High Plains Drilling

7-28-08

LINDA LINGLE



LAURA H. THIELEN

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. DONNA FAY K. KIYOSAKI, P.E. LAWRENCE H. MIIKE, M.D., J.D.

KEN C. KAWAHARA, P.E.

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

August 4, 2008

Ref: KapaaHighlands permits.exp

Mr. Marcus Fransden High Plains Drilling

Dear Mr. Fransden:

Expired Well Construction / Pump Installation Permits

Greg Allen Well (Well No. 0321-02)

Kapaa Highlands Well 1 (Well No. 0419-05)

Kapaa Highlands Well 2 (Well No. 0419-06)

Kapaa Highlands Well 3 (Well No. 0419-07)

Kapaa Highlands Well 4 (Well No. 0419-08)

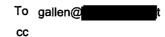
Our records indicate that the well construction and pump installation permits for the captioned wells have expired with incomplete work. The specific information we have is as follows:

1. Greg Allen Well (Well No. 0321-02)

- There is missing information on your well completion reports parts I and II, which we received on August 10, 2006. The Commission identified the deficiencies in an acknowledgement letter dated September 7, 2006, and in a letter dated December 4, 2006. While you have provided some information, both reports remain incomplete.
- There is an outstanding violation of the state well construction standards. To remedy the situation, you requested and the Commission granted an extension of your well construction permit to allow additional time to correct this violation. (Your proposal was to grout the bottom 20 feet of the well bore to seal off the brackish water you encountered at this depth.) This violation was identified in our September 7, 2006 and December 4, 2006 letters referenced above.
- Your permit was extended through May 23, 2008. That date has passed with no evidence
 that the work to correct the violation was completed in the time allowed. The well
 construction permit for this well has expired.
- You should be aware that your pump installation permit expired on August 1, 2008.
- You will need to apply for a new well construction permit and, if necessary, a pump installation permit in order to complete any additional work on this well.
- If the work to correct the violation was in fact done, you are required to submit a new Well Completion Report Part I with the current well construction information and a new Well Completion Report Part II with information showing how the pump installation was modified by the change in well depth.



Denise E Mills/DLN 07/30/2008 03:37 PM



0419-05 to 08

bcc

Subject well permits, CWRM 01/25/2008 letter

Aloha Greg,

Part of the message Lenore sent to me is that you asked for a scanned copy of the letter we sent to Marcus on January 25. The letter is attached to this message. The letter I wrote yesterday and which you should receive within the next few days recaps the details that we communicated to Marcus in previous correspondence. You will find most of what you need in our forthcoming letter, all summarized in one place. I hope this helps.

Please give me a call if you have questions.

-Denise

Denise E. Mills HYDROLOGIST

Hawaii Department of Land and Natural Resources Commission on Water Resource Management



FOF

CWRM_letter_01_25_2008.PDF



To Denise E Mills/DLNR/StateHiUS

.

bcc

Subject Outstanding Well Permits 0321-02, 0419-05 to 08

Denise,

Greg Allen called. He requested that we send another letter to his contractor reminding him that we are still awaiting completion of work on the subject wells, which permits have expired. He asked that we cc: him on this correspondence.

The database shows we sent a letter on 1/25/08. Greg would like a copy of that letter emailed to him @ net. \\neta \text{net.}

Please call him at

if you have any questions. Thanks, Lenore

Mr. Marcus Frandsen Page 2 January 25, 2008

Upon resolution of unfinished business, we will process the two new applications and issue the two new permits.

If you have any questions about your permit application, please contact Charley Ice of the Commission staff at (

Sincerely,

KEN C. KAWAHARA, P.E.

Deputy Director

Cl:ss

c: Steven Ruddell
Greg Allen
Kapaa Highlands, LLC
Moloaa Bay Land Company, LLC
Calvin Andrews
Brian Koppell
Aimee Moorhead
Elliott Rosenblum



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

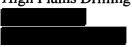
June 12, 2007

ALLAN A. SMITH

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D. STEPHANIE A. WHALEN

0419-05.wcr1a

Mr. Marcus Frandsen High Plains Drilling



Dear Mr. Frandsen:

Well Completion Report Part I for Kapaa Highlands Well #1 (Well No. 0419-05)

Thank you for your response to our January 2, 2007 letter. Based on the information we have received so far, we have identified the following remaining issues with the subject report:

- 1. Your response included a Memorandum from Tom Nance Water Resource Engineering documenting limited pump test information and a geologic assessment of subsurface conditions for an on-site exploratory borehole. However, no pump test information was provided for Well No. 0419-05. Please submit the raw pump test data for Well 0419-05.
- 2. Please be advised that per Section 2.9(c) of the Hawaii Well Construction & Pump Installation Standards (HWCPIS) the constant rate pump test should not be conducted until water levels in the well have completely recovered from the step-drawdown test. This regulation was not observed during the pump test conducted at the exploratory borehole, but must be complied with under the permit for Well Nos. 0419-05 to 08.
- 3. Please provide our office with the latitude and longitude (NAD 83) of the exploratory borehole. If this information is not available, the location of the exploratory borehole relative to wells 0419-05 through 0419-08 should be provided on a scaled map. What is the current status of the borehole?
- 4. If the exploratory borehole was drilled in the vicinity of Well 0419-05 and the subsurface conditions at the borehole can be assumed to reflect conditions at the well, then the well as constructed poses a significant potential for either contamination or waste, depending on head in the well. According to Section 2.4(c) of the HWCPIS solid casing should have been installed through the upper aquifer to the top of the confining layer to (1) prevent leakage into overlying or underlying formations and (2) to prevent the development of water from more than one aquifer. Why was the well not constructed according to these standards and in accordance with the recommendations in the Nance Memorandum?

- 5. Well 0419-05 was drilled to a maximum depth of more than 40% of the aquifer thickness. This violates Section 2.2 of the HWCPIS which restricts maximum well depth to no more than ¼ of the thickness of the aquifer. Please provide your reason(s) for exceeding the depth limitation. Further, a request for variance from the HWCPIS should have been submitted to the CWRM prior to the completion of the well. Why was a request for variance not submitted in advance?
- 6. For future pumping tests conducted at Wells 0419-05 and 0419-08, the CWRM requests that the impacts of pumping on the adjacent wells and stream be monitored. In particular, what is the approximate width and depth of water in the stream channel at the start and end of the tests? Are any changes in streamflow noted during the running of the tests?

In the case of already completed tests, if you happened to notice the presence or absence of water in the stream channel, or any changes to stream flow during testing, please provide this information to the CWRM.

7. Wells 0419-05 and 0419-08 are both located adjacent to a stream and marshy/wetland area. In order to better determine potential impacts to these sensitive habitats due to groundwater withdrawal, the CWRM requests that well 0419-05 be used as a monitoring well during pump testing of well 0419-08.

It appears that this well may be a substandard well. Depending on your responses to the above questions, we may recommend that the Commission require that this well be sealed.

If you have any questions, please contact Lenore Nakama of the Commission staff at

Sincerely,

W. Poy fardy W. ROY HARDY

Hydrologic Program Manager

LN:ss

MEMO and ROUTE SLIP (ver. 01/27/06)

| MACD | Check for Well No. | A 4 4 A A A B | |
|---------|---------------------|--------------------|--------------------------|
| VVI R 1 | L DACK TOF VVAIL NO | 0419-05 (su | nyov to rogulation momo) |
| 11011 | CHECK ICH TICH ITC. | 0413-00 (Su | rvey to regulation memo) |
| | | | · -,- , · |

12/20/06 wait for pg 1.

| 1. | Pump Tests Check Kevin Gooding | Yes | (initial) <u>No</u> | <u>lf no, des</u> | cribe deficiency | |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------|-------------------|-------------------------|------------|
| | Step-Drawdown Test: | | | | | |
| | followed WCPI Stds analysis attached proposed pump cap o.k. | | | | | |
| | Aquifer Pump Test: | | | | | |
| | followed WCPI Stds T & S analysis attached | | | | | |
| | Well Interference: estimated Steady-State drawdown at 1-mile radius is fi | t | | | | |
| | Stream Surface Water Impacted: | | □ ← | · If yes, identi | fy most probable stream | |
| | Geology Code for Well Index: | | | | | |
| | | 1 | | | | |
| 2. | Construction Check Mitch Ohye | <u>Yes</u> | (initial) No | If no, des | cribe deficiency | |
| | data complete followed Special Cond & elevation well database updated | ns 🗆 | No A | MISSIN PHOTO | is 1st price we | ł (|
| | | | Latitud | <u>le</u> | <u>Longitude</u> | |
| | NAD2 NAD8 | - | 22 04 22 04 | | 159 19 56 159 19 4(| |
| 3. | Charle /Lenore/Ryan | (initia | al) take a | action ba | ased on above an | alysis |
| | ATTACHMENTS FOR PUMP INSTALLATION PERMIT (2x): 1COVER LETTER 2COUNTY COMMENTS (DWS/SMA) 3DOH COMMENTS 4DLNR COMMENTS (LD/OCCL/DHP) 5WCR 1 Accept 6WELL CONST. COMPLETION CERTIFICATE 7USGS MAP UPDATED 9PARCEE CHECK 10GLENN'S PUMP TEST WORKSHEET 11WELL AS-Built CHECK PRINT: | | | | | |
| 5. 6. | Roy (initial) check (Enter Susan Hoagbin (initial) (initial) signature (Charle /Lenore) Ryan File | finali | ze | | • | abase) |

Well Check Program

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

| Data Input | | | |
|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|
| Well Number | 0419-05 | | <u> </u> |
| Well Name | Kapaa Highlands 1 | | |
| Ground Elevation | 25.6 | | |
| Cement Grout | 85 | | |
| Grouting Method | other | | |
| Hole Diameter | 16 | | , |
| Total Depth | 260 | | |
| Estimated Head | 14 | | |
| Public Water Supply Well? | ino | | |
| Solid Casing Material | steel | not plastic | <u> </u> |
| Solid Casing Specification | ASTM A53 | | |
| Solid Casing Length | 68 | | |
| Solid Casing Diameter | 8 | | |
| Solid Casing Wall Thickness | 0.25 | | |
| Open Casing Length | Annual Compile Compiler | | |
| Well Depth Theoretical Thickness of Aquifer 1/4 Aquifer Thickness | 574 143.5 | | |
| Depth of Well below Sea Level | -234.4 | too deep | Section 2.2 |
| Well Casing | | | |
| Minimum Wall Thickness | | | |
| Material | steel | | |
| Minimum Thickness per standards | 0.25 | | |
| Wall Thickness Provided | 0.25 | okay | Section 2.4(b) |
| Minimum Length of Solid Casing | | | |
| 90% of ground to top of aquifer | 10.44 | | |
| Length of solid casing Provided | | okay | Section 2.4(c) |
| Casing Material | ASTM A53 | in compliance | Section 2.4(d) |
| (for pvc only - check for 200' limit) | E Participal Communication of the Communication of | okay | Section 2.4(d) |
| Annular Space | | | |
| Depth of Grouting | | | |
| Calculated Depth of Grouting | 8.12 | L | |
| Depth of Grouting provided | 85 | okay | Section 2.6(c) |
| Minimum Annular Space required | 2 | | <u> </u> |
| Thickness of Annular Space | 1 | okay | Section 2.6(d) |



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

LAWRENCE H. MIIKE, M.D., J.D.
STEPHANIE A. WHALEN

DEAN A. NAKANO
ACTIMA DEBITY (NEECTOR

PETER T. YOUNG

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D.

January 2, 2007

0419-05.wcr1

Mr. Marcus Frandsen Valley Well Drilling



Dear Mr. Frandsen:

Well Completion Report Part I for Well No. 0419-05

We have received your Well Completion Report Part I for the Kapaa Highlands Well #1 (Well No. 0419-05). However, matters which must be addressed before we can accept your report as complete are as follows:

- 1. Please submit the first page of the subject report. We have attached a copy for your convenience. Please note that the most current version of the form is dated January 17, 2005, and for all future filings, the most current version should be used pursuant to Condition 8 of your permit.
- 2. Please submit a photograph of the well and concrete pad showing the benchmark on the concrete pad.
- 3. The elevations given in your as-built sectional drawing show that the bottom elevation of the well exceeds the ¼ aquifer thickness limitation, which is not in compliance with Section 2.2 of the Hawaii Well Construction and Pump Installation Standards (2004), which states:

"Except for salt-water wells, any well constructed in basal aquifers for the purpose of nonpotable or potable water withdrawal shall be initially designed and pump tested at a depth below sea level not exceeding one-fourth of the theoretical thickness (41 times the head) of the basal ground-water body, unless authorized by the Chairperson. Upon request by the permittee and submission of the supporting data and analysis, the Chairperson may allow deepening and subsequent testing of such wells to a depth below sea level not exceeding one-half of the theoretical thickness of the basal ground-water body."

Please provide your reason(s) why the depth limitation was exceeded and why prior approval was not obtained in advance.

4. Please submit the required aquifer tests to support the proposed installation of a 100 gpm capacity pump in the well.

Until these matters are addressed, we cannot issue the certificate(s) of well construction completion and/or pump installation completion that transfer(s) responsibility of all aspects of well usage and maintenance to the well operator/landowner. Please remember that the well may not be pumped for purposes other than well and aquifer testing until the certificates of 1) well construction completion and 2) pump installation completion have been issued, otherwise such pumpage would constitute a violation of the permit conditions. Since the permit is issued to the contractor, the contractor will be responsible for any non-testing pumpage violations when the certificates of completion have not been issued (where pumping tests are as defined in the Hawaii Well Construction and Pump Installation Standards). Please respond to the above item(s) within thirty (30) days of this letter's date. Failure to do so may result in fines of up to \$5,000 per day.

If you have any questions, please contact Lenore Nakama of the Commission staff at

Sincerely,

DEAN A. NAKANO Acting Deputy Director

LN:ss

Attachment

WELL CONSTRUCTION PERMIT

Kapaa Highlands 1 to 4 Wells, Well Nos. 0419-05 to 08

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 Kapaa Highlands 1 to 4 Wells (Well Nos. 0419-05 to 08) at TMK 4-3-03:01, Kauai, subject to the Hawaii Well Construction & Pump Installation Standards (HWCPIS - February 2004) which include but are not limited to the following conditions:

- The Chairperson of the Commission on Water Resource Management (Commission). 1. , shall be notified, in writing, at stant commission of the commission of water resource management (Commission), (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.
- 2. This permit shall be prominently displayed, or made available, at the site of construction work until work is completed.
- 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/forms.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. 3.
- 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.
- 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.
- In the event that subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal are encountered during construction, the permittee shall stop work and immediately contact the Department of Land and Natural Resources' Division of Historic Preservation. 6
- 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 or the authorization to construct the well shall not constitute a determination of correlative water rights. 7.
- 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/dinr/cwrm/forms.htm for current form).
- The permittee shall comply with all applicable laws, rules, and ordinances; non-compliance may be grounds for revocation of this permit. 9.
- The well construction permit application and any related staff submittal approved by the Commission are incorporated into this permit by reference. This permit is also subject to the HWCPIS. If the HWCPIS are not followed and as a consequence water is wasted or contaminated, a lien on the property may result. Any variances from the HWCPIS shall be approved by the Chairperson prior to invoking the variance. 10.
- 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. 11.
- 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) prior to any well sealing or plugging work. 12.
- 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. 13.

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 newwell construction/pump installation permit in accordance with Hawaii Administrative Rules §13-168-12(f). 14.

Special conditions in the attached cover transmittal letter are incorporated herein by reference. 15

PETER T. YOUNG Chairperson

Date of Approval: May 25, 2006 Expiration Date: May 25, 2008

Commission on Water Resource Management 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.

| Driller's Signatu | ire: Marcus Francier | C-57 License #: | 22-700 | Date: 8-4-06 |
|-------------------|----------------------|-----------------|--------|----------------------|
| | Marcus Frandsen | | | High Plains Drilling |

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

Attachment



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

PETER T. YOUNG

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D STEPHANIE A. WHALEN

DEAN A. NAKANO

June 14, 2006

Ref:0419-05 to 08.wcp

Mr. Marcus Frandsen High Plains Drilling



Dear Mr. Frandsen:

Well Construction Permit Kapaa Highlands 1 to 4 Wells (Well Nos. 0419-05 to 08)

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 13:

Special Conditions

- 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.
- Well Completion Reports and all other documentation must be consistent with the Well No.
 assignments shown on the attached map. This is necessary to avoid any confusion regarding
 well names, well numbers, and well completion information.
- 3. The wells shall be initially designed and pump tested at a depth below sea level not exceeding one-fourth of the theoretical thickness (41 times the head) of the basal ground-water body, unless authorized by the Chairperson.

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** for our files. For copies of the aquifer pump test worksheet, please call staff or visit www.state.hi.us/dlnr/cwrm/forms.htm.

Mr. Marcus Frandsen Page 2 June 14, 2006

<u>IMPORTANT</u> - 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 Lenore Y. Nakama of the Commission staff at

Sincerely,

Peter T. Young

Chairperson

Enclosures

c: Greg Allen, Kapaa Highlands, LLC (with applicable comments – DOH SDWB, WWB, CWB) USGS

Kauai DWS



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

PETER T. YOUNG

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D. STEPHANIF A. WHALEN

DEAN A. NAKANO

June 14, 2006

Ref:0419-05 to 08.pip

Mr. Marcus Frandsen High Plains Drilling



Dear Mr. Frandsen:

Pump Installation Permit Kapaa Highlands 1 to 4 Wells (Well Nos. 0419-05 to 08)

Enclosed are two (2) originals of your approved Pump Installation Permit for the captioned well(s) that authorize permanent pump installation work for your well(s). As part of the Chairperson's approval, the following special conditions were added and are part of your permit under Permit Condition 11:

Special Conditions

- 1. If the elevation benchmark needs to be altered, the permittee, well operator, and/or well owner shall ensure that the benchmark is transferred (or the well resurveyed) and documentation of the new benchmark shall be submitted to the Commission within sixty (60) days after the pump is installed.
- 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.
- 3. The permittee shall conduct aquifer pump tests in accordance with the Hawaii Well Construction and Pump Installation Standards (revised February 2004) on the latest aquifer pump test data forms, which are available by contacting staff or on the web at www.hawaii.gov/dlnr/cwrm/forms.htm.
- 4. Well Completion Reports and all other documentation must be consistent with the Well No. assignments shown on the attached map. This is necessary to avoid any confusion regarding well names, well numbers, and well completion information.

The permittee is responsible for <u>all</u> conditions of the permit. This includes ensuring the submission of a completed Well Completion Report Part II form within sixty (60) days after the pump installation work is completed. 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.

Mr. Marcus Frandsen Page 2 June 14, 2006

Please sign both permit originals and return one for our files.

<u>IMPORTANT</u> - Pump installation shall not commence until a fully signed permit is returned to the Commission.

If you have any questions, please call Lenore Y. Nakama of the Commission staff at

Sincerely,

Peter T. Young Chairperson

Enclosure

c: Greg Allen, Kapaa Highlands, LLC (with applicable comments – DOH SDWB, WWB, CWB)
 USGS
 Kauai DWS

PUMP INSTALLATION PERMITS Kapaa Highlands 1 to 4 Wells, Well Nos. 0417-05 to 08

Note: This permit shall be prominently displayed at the 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 pump installation for Kapaa Highlands 1 to 4 Wells (Well Nos. 0419-05 to 08) at TMK 4-3-03:01, Kauai, subject to the Hawaii Well Construction & Pump Installation Standards (HWCPIS - February 2004) which include but are not limited to the following conditions:

| condi | tions: | | |
|-------------------------|-------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | notified, in writing, a | at least two (2) weeks befor | Resource Management (Commission), shall be a early work covered by this permit commences and staff shall be allowed to inspect 8-15, Hawaii Administrative Rules |
| 2. | No withdrawal of wathe Commission. | ater shall be made other tha | n for testing until a Certificate of Pump Installation Completion has been issued by |
| 3. | This permit shall be | prominently displayed, or m | nade available, at the site of construction work until work is completed. |
| 4. | | | llation of a 100 gpm rated capacity, or less, pump in each well. This permanent mp test data does not support the capacity. |
| 5. | A water-level measur levels. | ement access shall be perma | anently installed, in a manner acceptable to the Chairperson, to accurately record water |
| 6. | | nstall an approved meter or measuring chlorides and te | other appropriate means for measuring and reporting withdrawals and appropriate mperature at the well head. |
| 7. | | | ted to the Chairperson within 60 days after completion of work. This form can be www.hawaii.gov/dlnr/cwrm. |
| 8. | | operator, and/or well owner evocation of this permit. | shall comply with all applicable laws, rules, and ordinances, and non-compliance |
| 9. | by reference. This pe | ermit is also subject to the I on the property may resu | related staff submittal approved by the Commission are incorporated into this permit HWCPIS. If the HWCPIS are not followed and as a consequence water is wasted or lt. Any variances from the HWCPIS shall be approved by the Chairperson prior to |
| 10. | approval, unless other | erwise specified. The perm | ermit application shall be completed within two (2) years from the date of permit nay be extended by the Chairperson upon a showing of good cause and goodit shall be submitted to the Chairperson no later than the date the permit expires. |
| 11. | liability, claim, or d | emand for property damag | ndemnify, defend, and hold the State of Hawaii harmless from and against any loss, the, personal injury, or death arising out of any act or omission of the applicant, ents under this permit or relating to or connected with the granting of this permit. |
| 12. | Special conditions in | the attached cover transmit | tal letter are incorporated herein by reference. |
| | | | W. Roy facely |
| Date | of Approval: | May 25, 2006 | PETER T. YOUNG, Chairperson |
| Expi | ration Date: | May 25, 2008 | Commission on Water Resource Management |
| prere pump transi | quisite and underlyin installer have signe Terred to any other en | g condition of my ability d, dated, and returned t | nit and understand them. I accept and agree to meet these conditions as a to proceed and understand that I shall not commence work until I and the the permit to the Commission. I understand that this permit is not to be that non-compliance with any permit condition may be grounds for revocation ermit date of approval. |
| Insta | aller's Signature: | v | C-57, C-57a, or A License #: 22-700 Date: |
| | | | |

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

Marcus Frandsen

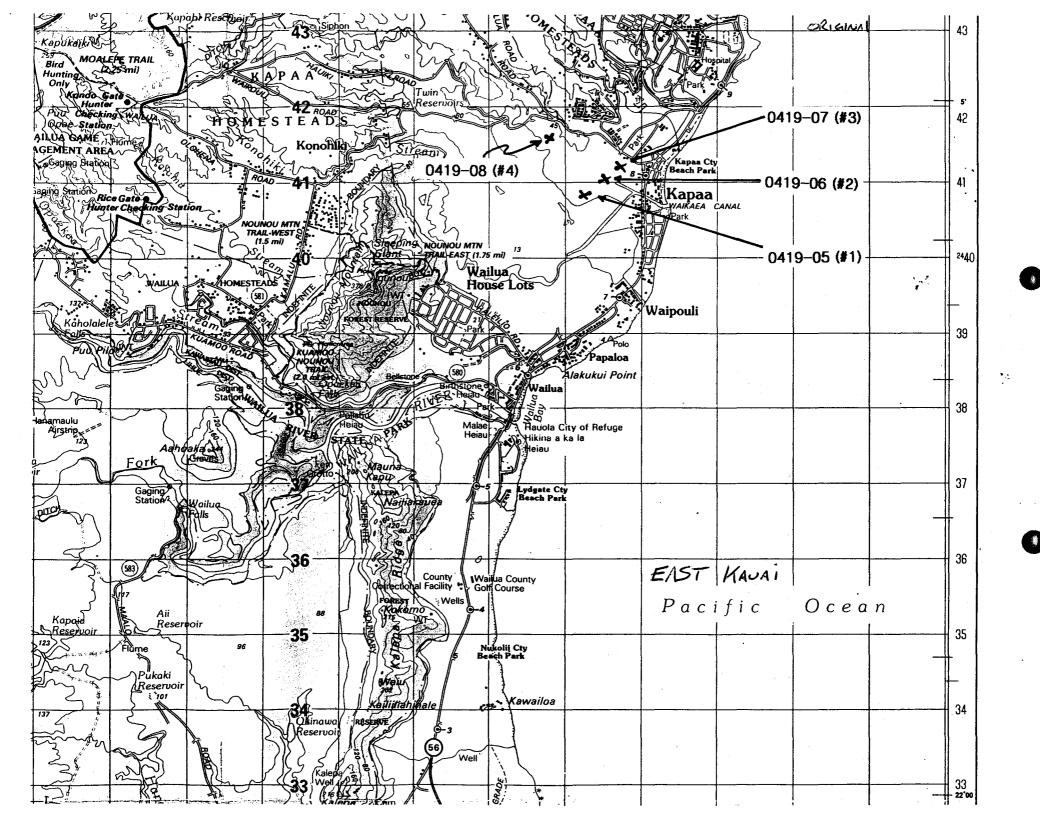
Firm or Title: High Plains Drilling

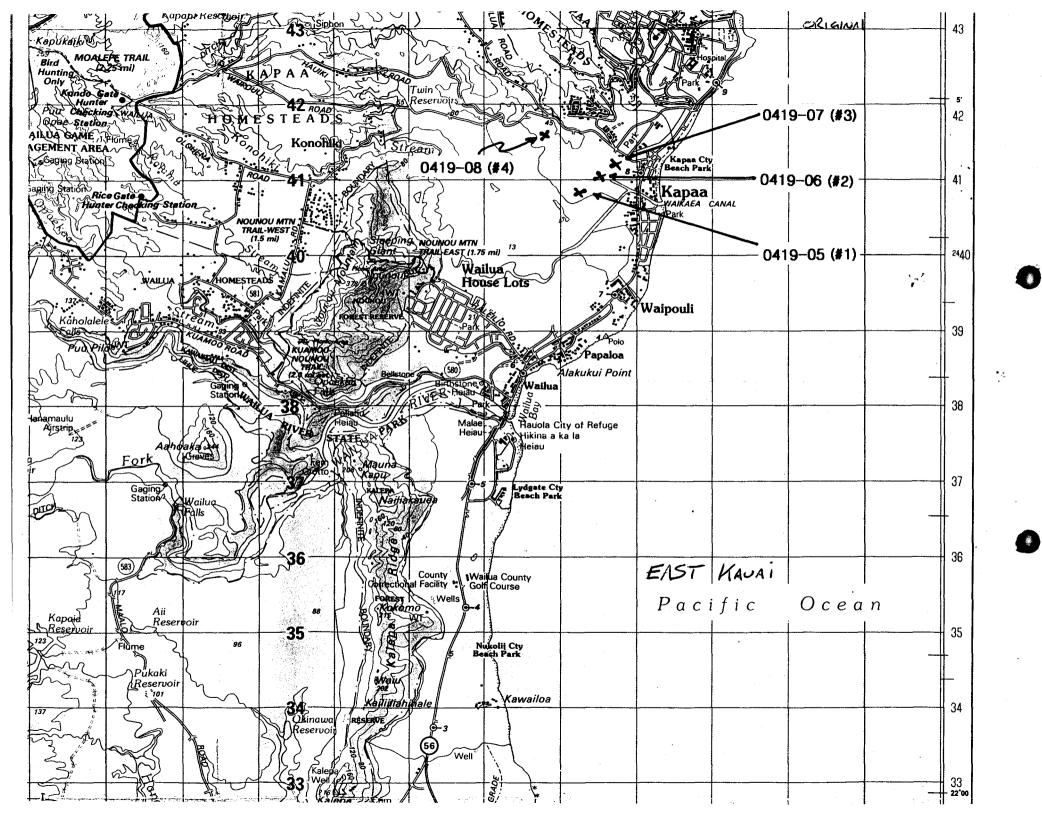
Printed Name:

Well Check Program

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

| Data Input | and (1 0010an) 100 1/ | | |
|---------------------------------------|-----------------------|-------------|-----------------------------------------|
| | | | |
| Well Number | 0419-05 to 08 | | |
| Well Name | Kapaa Hilands | | † · · · · · · · · · · · · · · · · · · · |
| Ground Elevation | 7 | | |
| Cement Grout | 190 | | |
| Grouting Method | positive displacement | | |
| Hole Diameter | 12 | | |
| Total Depth | 260 | | |
| Estimated Head | 0.1 | | |
| Public Water Supply Well? | no | | |
| Solid Casing Material | steel | not plastic | |
| Solid Casing Specification | ASTM A53 | | |
| Solid Casing Length | 190 | | |
| Solid Casing Diameter | 8 | | |
| Solid Casing Wall Thickness | 0.365 | | |
| Open Casing Length | | | |
| | | | |
| Results | • | | |
| | | | |
| Well Depth | | | |
| Theoretical Thickness of Aquifer | 4.1 | | |
| 1/4 Aquifer Thickness | 1.025 | | |
| Depth of Well below Sea Level | -253 | too deep | Section 2.2 |
| Well Casing | | | |
| Minimum Wall Thickness | | | |
| Material | steel | | |
| Minimum Thickness per standards | 0.25 | | |
| Wall Thickness Provided | 0.365 | okay | Section 2.4(b) |
| Minimum Length of Solid Casing | | | |
| 90% of ground to top of aquifer | 6.21 | | |
| Length of solid casing Provided | 190 | okay - | Section 2.4(c) |
| Casing Material | ASTM A53 | | Section 2.4(d) |
| (for pvc only - check for 200' limit) | | okay | Section 2.4(d) |
| Annular Space | | | |
| Depth of Grouting | | | |
| Calculated Depth of Grouting | 4.83 | | |
| Depth of Grouting provided | 190 | okay | Section 2.6(c) |
| Minimum Annular Space required | 1.5 | | |
| Thickness of Annular Space | 2 | okay | Section 2.6(d) |







RECEIVED



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

COMPASSION ON WATER HISTORIC PRESERVATION DIVISION RESOURCE MANAGEMENTAMOKILA BOULEVARD, ROOM 555

PETER T. YOUNG CHARPERSON BOARD OF LAND AND NATURAL RESOURCES COMMISSION ON WATER RESOURCE MANAGEMINT

> ROBERT K. MASUDA DEPUTY DIRECTOR - LAND

DEAN NAKANO ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUBLEAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES EMPORCEMENT
BOOMERING
FORESTRY AND VILLUIPE
HISTORIC PRESERVATION
KAHOOLAWE MISLAMD RESERVE COMMISSION

May 23, 2006

Dean Nakano, Acting Deputy Director Commission on Water Resource Management LOG NO: 2006.1625 DOC NO: 0605NM16

Archaeology

Dear Mr. Nakano:

SUBJECT: Chapter 6E-8 Historic Preservation Review [State/Kapaa Highlands]-

Well Construction/Pump Installation Permit Application Kapaa Highlands Wells 1-4 (Well Nos. 0419-05 to 08 Kapaa Ahupuaa, Kawaihau District, Island of Kauai

TMK: (4) 4-3-033: 001

The aforementioned project is for a well for the Kapaa Highlands LLC development.

We believe that "no historic properties will be affected," because:

a) intensive cultivation has altered the land
b) residential development/urbanization has altered the land
c) previous grubbing/grading has altered the land
d) an acceptable archaeological assessment or inventory survey found no historic properties
b) this project has gone through the historic review process, and mitigation has been completed.

e) this project has gone through the historic review process, and mitigation has been completed f) other: There is already an existing residences nearby and aerial photos from indicate that no

: Inere is already an existing restaences nearby and derial photos from indicate the historic sites exist on this parcel.

In the event that historic resources, including human skeletal remains, are identified during routine construction activities, all work needs to cease in the immediate vicinity of the find, the find needs to be protected from additional disturbance, and the State Historic Preservation Division, Kauai Section, needs to be contacted immediately at

Aloha,

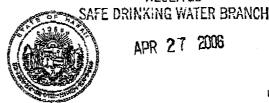
Melanie Chinen, Administrator State Historic Preservation Division

NM:jen

P.004/006

PETER 1. YOUNG

LINDA LINGLE



APR 27 2006

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKIND, M.G. LAWRENCE H. MIIKÉ, M.D., J.D. STEPHANIÉ A. WHALEN

DEAN A NAKANO

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

April 24, 2006

TO:

Honorable Chiyome L. Fukino, M.D., Director

Department of Health

Attention:

Director's Office

Harold Yee, Wastewater Branch Acting Branch Chief, Safe Drinking Water Branch Alec Wong, Clean Water Branch

FROM:

Peter T. Young, Chairperson

Commission on Water Resource Management

SUBJECT:

Well Construction/Pump Installation Permit Application Kapaa Highlands 1-4 Wells (Well Nos. 0419-05 to 08)

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 May 25, 2006. 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 application, request additional review time, please contact

| | e Y. Nakama of the Commission staff at |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LYN:s Attach | s ment(s) |
| RESPO | ONSE: |
| [] | 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 <u>prior</u> to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, §11-20-29. |
| M | 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 elemical 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 <u>prior</u> to implementation. |
| ι. | If the well is used to supply both petable and non-petable purposes in a single system, the user shall climinate cross-connections and backflow connections by physically separating patable and non-petable systems by an air gap or an approved backflow preventer, and by clearly labeling all non-potable spigets 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. |
| [1 | For the applicant's information, a source of possible wastewater contamination [] is [] is not located near the proposed well site (information attached). |
| [] | An NPDES permit is required. |
| 13 | Other relevant DOH rules/regulations, information, or recommendations are attached. |
| 1) | 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 |
| Contac | et Person: Ann T. Zane Phone: |
| Signed | Phone: |

MAY-18-2006 10:35AM

FAX: 8085864351

ID:DLNR CWRM

PAGE: 004 R=96%



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

APR 27 2006

PETER T. YOUNG

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D. STEPHANIE A. WHALEN

DEAN A. NAKANO

All. KBT

April 24, 2006

TO:

Honorable Chiyome L. Fukino, M.D., Director

Department of Health

Attention:

Director's Office

Harold Yee, Wastewater Branch

Acting Branch Chief, Safe Drinking Water Branch

Alec Wong, Clean Water Branch

FROM:

Peter T. Young, Chairperson

Commission on Water Resource Management

SUBJECT:

Well Construction/Pump Installation Permit Application

Kapaa Highlands 1-4 Wells (Well Nos. 0419-05 to 08)

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 May 25, 2006. 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 Lenore Y. Nakama of the Commission staff at

| LYN: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 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. |
| | |

- 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 <u>prior</u> to 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 []
- [] It does not appear that this well will be used for consumptive purposes and is not subject to Safe Drinking Water Regulations.

Septio tank#3123

An NPDES permit is required.

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

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

Date: 04-20-2006

LINDA LINGLE GOVERNOR OF HAWAII



CHIYOME LEINAALA FUKINO, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:

Wastewater Branch

A septic tank file has been found and the following information is provided. In general, the Department of Health has reviewed and approved of the plans based on the information submitted as verification that a treatment individual wastewater system (IWS) such as a septic tank was constructed and authorized to be used for wastewater disposal from a building/dwelling.

Tax Map Key number

(H) H_- 3 - 003 : 00/

| Tax Map Key number | (1) 7 0 0 0 |
|-----------------------------------------------------------------------|----------------------------------------------------------|
| Address | Kapaa Intermedicate - olohena |
| Septic Tank File # | (3/23 Rd |
| Applicant Name | Kapaa Intermediati |
| Submit Plan Date | 12 111 1995 |
| Plan Approval Date | 01 , 20 , 1996 |
| Inspection Date | |
| System Approved for Use Date | 03 , 10 , 1997 |
| BPA Date | / |
| System / Disposal Via Use For Designed By Percolation Rate / Capacity | Septiv tank, Trench Ochool Pujita min/in 135400 gallons |
| For further information, you may call the | Wastewater Branch engineer as listed: |
| For Oahu & Kauai: contact Johnny at (| Ong at the Wastewater Branch office on Oahu |
| [] For Kona: Dane Hiromasa at the k | Cealakekua Health Center at |
| [] For Hilo: Jerry Nunogawa at the H | awaii District Health Office |
| [] For Maui: Roland Tejano at the Ma | ui District Health Office at |
| cesspool faxes.wpd sam revised January 10, 2006 | |

LINDA LINGLE GOVERNOR OF HAWAII

TO:



PETER T. YOUNG CHAIRPERSON

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D. STEPHANIE A. WHALEN

DEAN A. NAKANO ACTING DEPUTY DIRECTOR

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

April 24, 2006

Russell Tsuji, Administrator

| | Land Di | vision R | | Hard Hard | APR | ≧22 | , |
|---------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------|--------------------|------------------|----|
| FRO | | Nakano, Acting Deputy Director sion on Water Resource Management | | | 25 , | O DIV | |
| SUBJ | | nstruction/Pump Installation Permit A lighlands 1-4 Wells (Well Nos. 0419- | | ND & URCES | A 11: 33 | ISION | |
| Instal | Transmitted for slation permit application | your review and comment is a copy of cation. | the captioned W | ell Construc | ction/Pu | np | |
| May: | and objectives spe | ciate your comments on the captioned cific to your division. Please respond not receive comments or a request for comments. | l by returning tl | his cover m | emo for | m by | |
| | t application, reque | ettached maps to locate the proposed we est additional information, or request acceed Commission staff at | ell. If you have a | any question time, please | s about contact | this | |
| LYN: Attac | ss nment(s) | | | | | | |
| RESP | ONSE: | | | | | | |
| [] | A water lease/pern division. | nit is required of this applicant and an app | lication for such w | rill be request | ed by ou | • | |
| [XX] | A water lease/pern | nit is not required of this applicant. | | ed en | S | | |
| [] | A water lease/pern | nit has been obtained by the applicant thro | ugh lease no | | 73 | <u> </u> | |
| [] | Other relevant Lan | nd Division rules/regulations, information, | or recommendation | ons are attach | ed: | | |
| [] | No objections | | | | Þ | , e ² | |
| x[x] | Other comments: | Original source of private statehood. | title is Grä | nt 5266 i | ر ن | orior | to |
| Conta | ct Person: | Gary Martin | Phone: | | <i>ප</i> _ | | |
| Signe | d: Hary | menti | Date: Al | PR 2 6 20 | 006 | | |



PETER T. YOUNG

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARAL CHIYOME L. FUKINO, M.D. LAWRENCË H. MIIKE M.D., J.D. STEPHANIE A. WHALEN

DEAN A. NAKANO

II DEAN ACYNG I L RESOURCES

Bassar was

STATE OF HÁWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

COMMISSION ON WATER RESOURCE MANAGEMENT

April 24, 2006

TO:

Honorable Chiyome L. Fukino, M.D., Director

Department of Health

Attention:

Director's Office

Harold Yee, Wastewater Branch

Acting Branch Chief, Safe Drinking Water Branch

Alec Wong, Clean Water Branch

FROM:

LYN:ss

Peter T. Young, Chairperson

Commission on Water Resource Management

SUBJECT:

Well Construction/Pump Installation Permit Application

Kapaa Highlands 1-4 Wells (Well Nos. 04||9-05 to 08)

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 May 25, 2006. 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 Lenore Y. Nakama of the Commission staff at 587-0218.

| Attacl | hment(s) |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RESP | ONSE: |
| 11 | This well qualifies as a source which will serve us 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 <u>prior</u> to its use to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, Rules Relating to Potable Water Systems, § 1-20-29. |
| 11 | 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 routiaely 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. |
| [] | 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 prevenuer, and by clearly labeling all non-potable spigots with warning signs to prevent inadventent consumption of non-pitable 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 is not located near the proposed well site (information anached). |
| [] | An NPDES permit is required. |
| \$ | Other relevant DOH rules/regulations, information, or recommendations are attached. |
| ίÌ | 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 |
| Conta | ict Person: KWN6K9 Phone: S00 P3 |
| Signe | d: Orling Date: 4/27/06 0625/2 |

he Department of Health, Clean Water Branch has the following domments:

For Well-Drilling Activities

ny discharge to State waters of treated process wastewater effluent associated with well drilling activities is agulated by Hawaii Administrative Rules, Title 11, Chapter 55, Appendix I, effective September 22, 1997. Treated process wastewater effluent covered by this general permit includes well drilling sturries, lubricating luids wastewaters, and well purge wastewaters. This general permit does not cover well pump testing. The applicable Notice of Intent Forms and filing fee shall be submitted at least thirty (30) days before the start of discharge to the Department of Health, Clean Water Branch at 19

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 the 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 that 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.

JS/cr

| | | | | <u></u> | _ |
|-------------------|----------|----------|----|----------------|---|
| Post-it* Fax Note | 7671 | Date [4] | 27 | (06 pages > "> | |
| tenore V | alexanon | From | 4 | ecisons | _ |
| OBONR COU | RM | co. D | 0 | W/CWB- | _ |
| | | | | | ~ |
| | | | | | _ |

APR-27-2006 **02:32PM**

FAX:



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

DEAN A. NAKANO

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D. STEPHANIE A. WHALEN

PETER T. YOUNG MEREDITH J. CHING

April 24, 2006

0419-05 to 08.rev

Mr. Marcus Frandsen **High Plains Drilling**

Dear Mr. Frandsen:

Well Construction/Pump Installation Permit Application for Well Nos. 0419-05 to 08

We have received additional information and the filing fee for your Well Construction/Pump Installation permit application for the Kapaa Highlands 1-4 Wells (Well Nos. 0419-05 to 08). However, your application is still incomplete pending the resolution of outstanding issues with other permits, as outlined in our March 15, 2006 letter.

To expedite the permitting process, we will send your incomplete application for review, and if the review warrants the issuance of a permit, a letter of assurance will be issued. The letter of assurance will indicate that a permit will be approved and issued provided that the following conditions are met: a) you have no outstanding issues with the Commission; b) there have been no significant changes to the application; c) there have been no significant changes to applicable laws, rules, regulations; d) there have been no significant changes to hydrologic conditions. Until the permit is issued, no drilling shall commence. Drilling without a permit is subject to fines of up to \$5,000 per day.

We will allow a single application for the four subject wells, provided that the Well Completion Reports and all other documentation are consistent with the Well No. assignments shown on the attached map. This is necessary to avoid any confusion regarding well names, well numbers, and well completion information.

For your information, 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 water may not be pumped for purposes other than testing until the certificate of well construction/pump installation completion letter is issued to the well operator and landowner. Additionally, 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. No certificate of pump installation will be issued until the Commission has determined that the pump capacity will not have adverse effects on the aquifer, other nearby wells, or streams. In other words, you may need to remove the pump and install a smaller pump at the Commission's discretion before you can withdraw water for purposes other than testing.

If you have any questions about your permit application, please contact Lenore Y. Nakama of the Commission staff at

DEAN A. NAKANO **Acting Deputy Director**

LYN:ss Attachment

c: Greg Allen, Kapaa Highlands, LLC



PETER T. YOUNG

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D. STEPHANIE A. WHALEN

> DEAN A. NAKANO ACTING DEPUTY DIRECTOR

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



April 24, 2006

TO:

Honorable Chiyome L. Fukino, M.D., Director

Department of Health

Attention:

Director's Office

Harold Yee, Wastewater Branch

Acting Branch Chief, Safe Drinking Water Branch

Alec Wong, Clean Water Branch

P

FROM:

Peter T. Young, Chairperson

Commission on Water Resource Management

SUBJECT:

Well Construction/Pump Installation Permit Application

Kapaa Highlands 1-4 Wells (Well Nos. 0419-05 to 08)

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 May 25, 2006. 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 Lenore Y. Nakama of the Commission staff at a second contact.

| LYN Atta | V:ss chment(s) |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RES | PONSE: |
| [] | 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 <u>prior</u> to its use to comply with Hawaii Administrative Rules (HAR), 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 increases to meet the public water system definition then Director of Health approval is required prior to implementation. |
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| [] | 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 [] is not located near the proposed well site (information attached). |
| [] | 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 |
| Cont | tact Person: Phone: |
| G : | D. A. |



PETER T. YOUNG

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D. STEPHANIE A. WHALEN

> DEAN A. NAKANO ACTING DEPUTY DIRECTOR

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

April 24, 2006

| 7 | ro. | |
|---|------|--|
| | (). | |

Russell Tsuji, Administrator

Land Division

FROM:

Dean A. Nakano, Acting Deputy Director

Commission on Water Resource Management

SUBJECT:

Well Construction/Pump Installation Permit Application

Kapaa Highlands 1-4 Wells (Well Nos. 0419-05 to 08)

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 May 25, 2006. 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 Lenore Y. Nakama of the Commission staff at a second contact.

| Attachment(s) | | | | | | | |
|---------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--|--|--|--|--|
| RESI | SPONSE: | | | | | | |
| [] | A water lease/permit is required of this applicant and an application for such will be requested by o division. | | | | | | |
| | A water lease/permit is <u>not</u> required of this applicant. | | | | | | |
| [] | A water lease/permit has been obtained by the applicant throu | 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: | | | | | | |
| Conta | ntact Person: | Phone: | | | | | |
| Signe | ned: | Date: | | | | | |



PETER T. YOUNG

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D. STEPHANIE A. WHALEN

DEAN A. NAKANO ACTING DEPUTY DIRECTOR

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

April 24, 2006 TO: Melanie Chinen, Administrator Historic Preservation FROM: Dean A. Nakano, Acting Deputy Director Commission on Water Resource Management SUBJECT: Well Construction/Pump Installation Permit Application Kapaa Highlands 1-4 Wells (Well Nos. 0419-05 to 08) 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 May 25, 2006. 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 or request additional review time, please contact Lenore Y. Nakama of the Commission staff at can be provided by the applicant, please contact the applicant directly at the contact information provided on the application form. LYN:ss Attachment(s) **RESPONSE:** This is a [] public (county or state) project [] private project and [] will [] may disturb historic sites. [] We concur that the work described under this permit will not disturb historic sites. [] We do not concur that the work described under this permit will not disturb historic sites. We require the following for []our concurrence: Contact Person: Phone: Date: Signed:



STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES

PETER T. YOUNG

MEREDITH J. CHING NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D. STEPHANIE A. WHALEN

DEAN A. NAKANO

March 15, 2006

COMMISSION ON WATER RESOURCE MANAGEMENT

Kapaa Highlands 1 to 4 ack)

Mr. Marcus Frandsen High Plains Drilling



Dear Mr. Frandsen:

دے

Well Construction/Pump Installation Permit Application for Kapaa Highlands 1 to 4 Wells

We have received your Well Construction/Pump Installation permit application for the Kapaa Highlands 1 to 4 Wells. However, your application is incomplete. Please submit the following items which must be addressed before we can accept your application as complete:

1. An original and 10 copies of the relevant portion of a 7.5 Minute Series USGS topographic map (scale 1:24,000) with well locations labeled and including the name of the quad map.

2. An original and 10 copies of a property tax map, showing well locations referenced to established property boundaries.

3. An original and 10 copies of a photograph of the proposed well site.

4. \$25.00 filing fee (please make check payable to the Department of Land and Natural Resources).

5. Surveyor's name and license number (for the required elevation surveys).

WAGNER ENGINEERING ROUND J WAGNER

6. Confirmation that you will be the operator of the source, i.e. will assume longterm responsibility for reporting water use, well maintenance, etc.

YES IT WILL BE PART OF THE CCERS 7. Confirmation that the proposed solid casing material is ASTM A53, Grade B.

YES THIS IS CORRECT. Also ON Application .15,2006

- 8. A completed Well Completion Report Part II for the Hill Well (Well No. 1018-01). The pump installation permit expired on October 31, 2005.
- 9. A signed copy of the permit for the Aloha Mana Well (Well No. 0918-03). Revol
- 10. A completed Well Completion Report Part II for the Aloha Mana Well (Well No. 0918-03). The pump installation permit expired on June 13, 2005.

Upon receipt of the above information, we will accept your application as complete and you can then expect your application to be processed within ninety (90) days.

If you have any questions about your permit application, please contact Lenore Y. Nakama of the Commission staff at

Sincerely,

DEAN A. NAKANO Acting Deputy Director

LYN:ss

c: Greg Allen

AlollA LENORE

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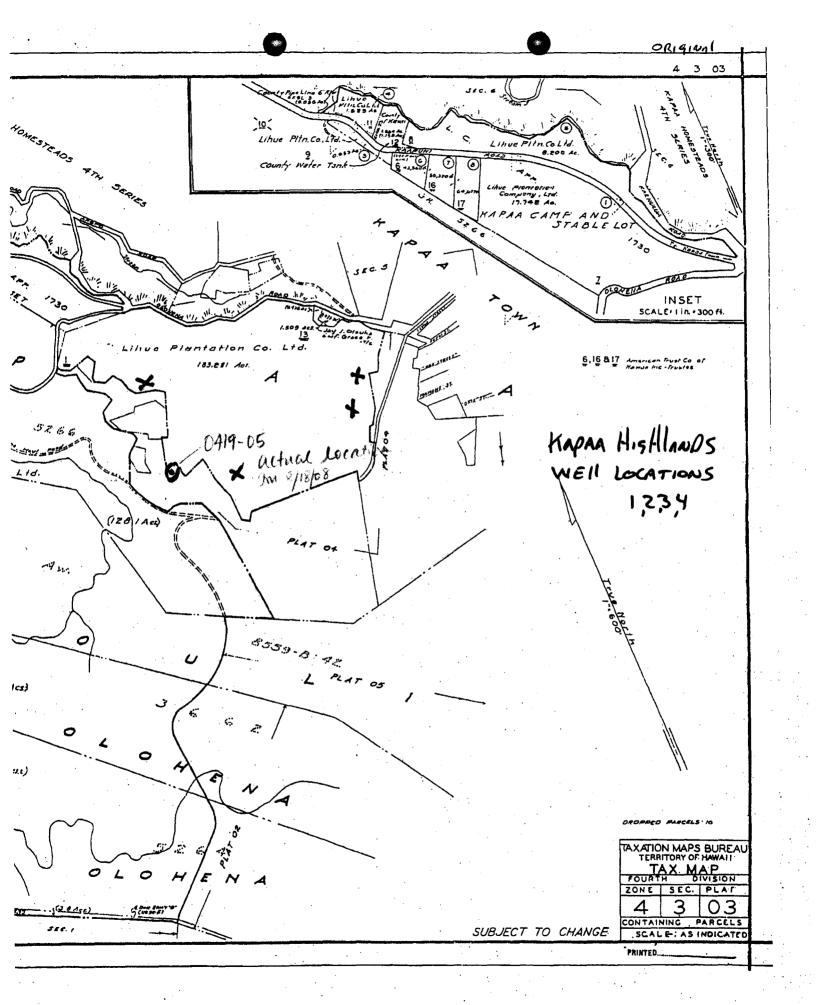
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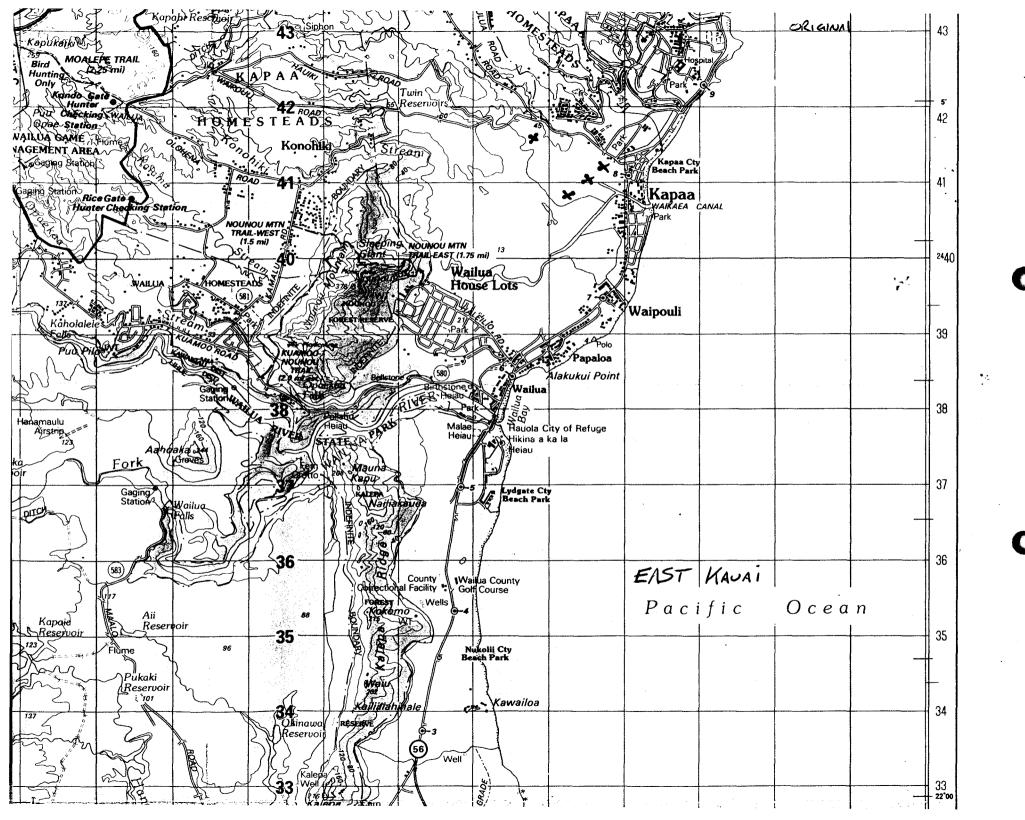
KAPAA BYPASS ROAD





KAPAA HI9HlANDS WEll LOCATIONS 1,2,3,4 TMK 4-3-03.1

KAPAA MIDDIE SCHOOL



DATE: March 22, 2006

| DOCUMENT NO.: | | | | | | | DATE: Watch 22, 2000 | | | | |
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| s | 06 | 326 | С | 1026 | 0752 | | | | (1) | \$25.00 | Valley Well Drilling LLC |
| " | " | 11 | " | 11 | " | | | | (2) | 25.00 | Greg Allen |
| | | | | | | | | | (3) | | |
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STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES COMMISSION ON WATER RESOURCE MANAGEMENT

PETER T. YOUNG

MEREDITH J. CHING JAMES A. FRAZIER NEAL S. FUJIWARA CHIYOME L. FUKINO, M.D. LAWRENCE H. MIIKE, M.D., J.D. STEPHANIE A. WHALEN

> DEAN A. NAKANO ACTING DEPUTY DIRECTOR

March 15, 2006

Kapaa Highlands 1 to 4.ack

Mr. Marcus Frandsen High Plains Drilling



Dear Mr. Frandsen:

Well Construction/Pump Installation Permit Application for Kapaa Highlands 1 to 4 Wells

We have received your Well Construction/Pump Installation permit application for the Kapaa Highlands 1 to 4 Wells. However, your application is incomplete. Please submit the following items which must be addressed before we can accept your application as complete:

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- 2. An original and 10 copies of a property tax map, showing well locations referenced to established property boundaries.
- 3. An original and 10 copies of a photograph of the proposed well site.
- 4. \$25.00 filing fee (please make check payable to the Department of Land and Natural Resources).
- 5. Surveyor's name and license number (for the required elevation surveys).
- 6. Confirmation that you will be the operator of the source, i.e. will assume long-term responsibility for reporting water use, well maintenance, etc.
- 7. Confirmation that the proposed solid casing material is ASTM A53, Grade B.

Mr. Marcus Frandsen Page 2 March 15, 2006

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Upon receipt of the above information, we will accept your application as complete and you can then expect your application to be processed within ninety (90) days.

If you have any questions about your permit application, please contact Lenore Y. Nakama of the Commission staff at

Sincerely,

DEAN A. NAKANO

Acting Deputy Director

LYN:ss

c: Greg Allen



430030010000

OLOHENA RD

ALLEN FAMILY LLC

General Parcel Information

Site Address Apartment No. **Total Parcel Area** OLOHENA RD

163.125 acres

Ownership

Owner

Address

State Country

Zip Code Owner Type

THREE STOOGES LLC

KAPAA н 96746

Fee Owner

ALLEN FAMILY LLC

FLAGSTAFF AZ

86004

Fee Owner

MOLOA'A BAY VENTURES

Fee Owner

Data Last Updated: 3/3/2006

Disclaimer

The County of Kauai Real Property Assessment and Treasury Divisions make every possible effort to produce and publish the most current and accurate information available. No warranties, expressed or implied, are provided for the data herein, its use, or its interpretation. Utilization of the search facility indicates understanding and acceptance of this statement by the user.

TO MAKE A PAYMENT

Make your check or money order payable to:

DIRECTOR OF FINANCE

Mail to or pay in person at the following address:

COUNTY OF KAUAI REAL PROPERTY TAX COLLECTION 4444 RICE ST STE 463 LIHUE HI 96766

> Last Updated: 3/3/2006 Printed on Monday, March 13, 2006, at 7:17:13 PM EST

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

| For O | fficial | Use | Only: |
|-------|---------|-----|-------|
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06 MAR 6

A8: 55

Instructions: Please print in ink or type and send completed application with attachments to the Commission on Water Resource Management, Please Application must be accompanied by 10 copies and a non-refundable filing fee of \$25.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 587-0225. For further information and updates to this application form, visit http://www.hawaii.gov/dlnr/cwm. WELL LOCATION INFORMATION

| STATE WELL NO (if already assigned) 2 WELL NAME | 3 ISLAND | 4. TMK | 11 | 7 | - 3 | - / |
|-------------------------------------------------------------------------------|-----------------------------------|-----------------|----------|-----|------|-------|
| 419-05 to 08 KAPAN MIGHLA | NDS 1-4 Kana | | 7 | . ح | .00 | . 6 / |
| 111 0) 1000 | WED ! (MONI | | zone | sec | pla: | 08/0 |
| he following must be attached before this application is accepted as complete | e: | | | | | |
| • 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 propert | y boundaries | | | | | |
| Photograph of the proposed well site | | | | | | |
| • A schematic disgram showing the well site, access road and proposed we | III infractructure | | | | | |

| Photograph of the proposed well site A schematic diagram showing the well site, access road and p | ronosed well infrastructure | | |
|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| 5. WELL OPERATOR'S NAME/COMPANY Well Operator | | 6 LANDOWNER'S NAME/COMPANY | Landowner's Contact |
| HIGH PLANES WELL DRILLING MARCUS | FRANSON | KAPAA HIGHLANDS LLC | GRES AllEN |
| Mad O | | a management of the state of th | |
| | | | |
| | | | |
| Well Operator's Phone Well Operator's Fax Well O | perator's E-mail | | |
| | | 5C1 1 3 1 3 | |
| PROPOSED WELL CONSTRUCTION | PROPOSED PU | MP INSTALLATION | |
| 7. Proposed Work 8. Construction Type | 10. Proposed Work | 11. Proposed Pumping Rate, gpm | 13. Method of flow measurement |
| Construct New Well | Install New Pump | (gallons per minute) | ⊠ Flowmeter |
| ☐ Modify Existing Well ☐ Dug | ☐ Replace Pump | 100 EACH | │ □ Open Pipe □ Weir |
| ☐ Abandon/Seal Well ☐ Shaft ☐ Tunnel | | 12. Proposed Amount of | ☐ Orifice |
| C fullier | | Withdrawal, gpd (gallons per day) | ☐ Other (explain) |
| 9. Is this well part of a battery of wells? ▼ Yes □ No | | 300,000 | |
| 14. Proposed Surveyor name and license number (a s | urveyor is required for | all Well Construction Permits and m | |
| Installation Permits) WAGNER ENGINE | ERING RO | NALD J. WAGNER | # 3074 × |
| | | | 33 11 |
| PROPOSED USE | N | | |
| ☐ 15. Municipal (water systems serving greater than 25 in | ndividuals or 15 service o | connections) | |
| ☐ 16. Domestic Number of units to be served | | | |
| ☐ 17. Industrial (describe) | and the second s | | |
| | | A | |
| № 18. Irrigation (describe crop and no. of acres) | AG/CP | No specific | Chops |
| ☐ 19. Military (describe) | | | |
| ☐ 20 Other (describe) | | | |
| OTHER LEGAL RECHIRENTS | | | |
| OTHER LEGAL REQUIREMENTS If require | d, items 21. and 22. mus | st be obtained before the Commission of | can legally issue a permit: |
| 21. Conservation District Use Permit (CDUP) | | | |
| ☐ Required, CDUP # | oved | | |
| I have not checked with OCCL about whether or not a | CDUP is required. Lund | erstand that checking with OCCL prior | to making this application will |
| expedite my review. I further understand that issues ra | sised by this agency may | delay or result in denial of the permit i | ssuance, or revocation of the |
| permit after it is issued. | and the contract of the second page of the second p | | |
| 22. Special Management Area Permit (SMAP) ☐ Required, SMA # date approv | od | | |
| ☐ Required, SMA # date approv ☐ Not Required (attach documentation from applicable Company) | ounty agency) | | |
| I have not checked with the county about whether or no | | ired. I understand that checking with the | he County prior to making this |
| application will expedite my review further understar | nd that issues raised by t | his agency may delay or result in denia | of the permit issuance, or |
| revocation of the permit after it is issued 23 Historic Preservation Division (HPD) of the Department | nt of Land and Natural R | esources | |
| ☐ I have consulted with the HPD regarding potential imp | | | hed applicable documentation |
| from the HPD. | | | |
| 🛮 I have not consulted with the HPD regarding potential | impacts of well construct | tion activities on historic sites. I unders | tand that checking with the HPD |

prior to making this application will expedite my review. I further understand that issues raised by this agency may delay or result in denial of the permit issuance, or revocation of the permit after it is issued. Additionally, the history of past land use is attached.

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

1-4 WELL SYS FOR AG HZO SUPPLY INITALLY TEST ONLY

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 permit approval: 1) the proposed work is to be completed within two (2) years of the approval date; 2) the contractor shall submit to the Commission a well completion/abandonment 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 in to compliance, and any work done while the permit is in suspension may result in fines of up to \$5000/day 25. PUMP INSTALLER (Must be filled out if application is for Pump Installation)

| 24 | WELL | DRIL | LER | (Must be filled out if application is for Well Construction) | |
|----|------|------|-----|--------------------------------------------------------------|--|
| | | | _ | · • • • • • • • • • • • • • • • • • • • | |

High Plains Dril

MAYOUS Frances 3-2-06

PROPOSED WELL SECTION (Please attach schematic if different from diagram provided below) Hole Diameter: 12 Elevation at top of casing 8.5 ft., msl Minimum of 2' Radius & 4" Thick Concrete Pad (to contain benchmark surveyed to nearest 0.01 ft.) Ground Elevation: ft., msl* Please refer to the Cement Grout: 190 HAWAII WELL CONSTRUCTION AND (min. 70% of distance from **PUMP INSTALLATION STANDARDS** ground elevation to top of to ensure that your as-built is in compliance with water surface or 500 ft., applicable standards. whichever is less.) Annular space between hole Solid Casing: (≥ 90% x (Ground Elev.-Water Level Elev)) Grouting method: and casing (1.5" for positive Positive Total Length: _ displacement, 3" for other displacement methods): Nominal Diameter: □ Other Wall Thickness: Bottom Elevation: Rock or Gravel Packing Total Depth Open Casing: ☐ Perforated 260 ft. Material: Total Length: ☐ Crushed Basalt Nominal Diameter: ☐ Rounded Gravel Wall Thickness: Estimated Water Level Bottom Elevation: Elevation: note: Neither bentonite nor mud should be used in ___ft. msl* saturated zone during drilling Open Hole: Length: Diameter: Bottom Elevation: 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 - 4) x Water Level Elevation) Example: Estimated + 2 ft. Water Level Elev. \longrightarrow Bottom Elevation of Well Limit = $\left(2 - \frac{4 \ln \chi(2)}{4}\right) = -18.5 \text{ ft}$ Solid Casing Material: * Carbon Steel: compliant with (check one or more):

ANSI/AWWA C200 API Spec. 5L And compliant with (check one or more): ☐ ASTM A242 (or A606) ☐ Type E ☐ Other Stainless Steel: (check one): ☐ ASTM A409 (production wells) ☐ ASTM A312 (monitor wells) ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one) ☐ 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) ☐ 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 X ASTM A53 ☐ ASTM A139 ☐ Type S 💓 Grade B And compliant with (check one or more): ☐ ASTM A242 (or A606) ☐ Type E ☐ ASTM A312 (monitor wells) Stainless Steel: (check one): ☐ ASTM A409 (production wells) 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) ☐ 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

* Submitted 4/21/06. W

Kapaa Highlands LLC 06 MAR 6 A8:55

March 2, 2006

State of Hawaii Dept of Land and Natural Resources Commission on Water Resource Management

Aloha.

The purpose of this application is to provide agricultural water to a 52 unit CPR that is in the permit process. The old Ag ditch system is no longer contiguous and several parcels of land that it crosses are without easements.

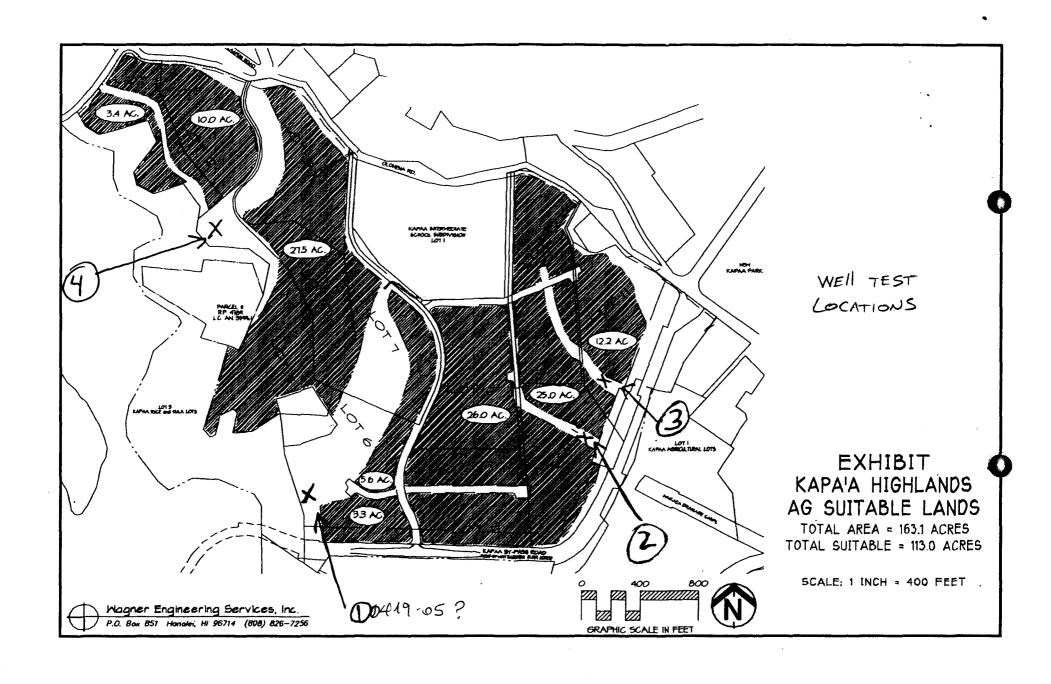
Initially we want to drill to test the practicality of, and to get test data from one to four possible wells.

If they will work and the county will finalize our application for subdivision, then we would want to complete the wells for supplying Ag water.

Please call Greg Allen questions.

with any

THANKS, GARG



Well Background Check

| | | | | | | | We | II Cons | tructi | ion | Pum | ip Inst | allatio | on |
|------------|----------|-------------------|---------------------------|---------|------------|------|------------|-------------|-----------|------------|------------|------------|------------|------------|
| Approved | Well No. | Well Name | Applicant | Driller | Pump Inst. | Type | Issued | Signed | WCR1 | Accept | Issued | Signed | WCR2 | Accept |
| | | Kapaa Highlands | Kapaa Highlands, LLC | C-22700 | C-22700 | вотн | | | | | | | | |
| | | Kapaa Highlands | Kapaa Highlands, LLC | C-22700 | C-22700 | вотн | | | | | | | | |
| | | Kapaa Highlands | Kapaa Highlands, LLC | C-22700 | C-22700 | вотн | | | | | | | | |
| | | Kapaa Highlands | Kapaa Highlands, LLC | C-22700 | C-22700 | вотн | | | | | | | | |
| | | Kawaikini Estates | Eric A. Braun | C-22700 | C-22700 | вотн | | | | | | | | |
| 10/13/2000 | 5945-04 | Ceatech Pltns 4 | Ceatech Plantations, Inc. | C-22700 | C-22700 | вотн | 11/3/2000 | 11/8/2000 1 | 1/18/2002 | 11/18/2002 | 11/26/2002 | 2/5/2003 | 2/12/2003 | 2/12/2003 |
| 1/19/2001 | 1018-01 | Hill | Richard S. Hill | C-22700 | | вотн | 1/23/2001 | 6/25/2002 | 1/28/2002 | 1/28/2002 | 2/14/2002 | 6/25/2002 | | |
| 7/23/2001 | 1120-39 | Kawaihau Meado | Stephen F. Williams | C-22700 | C-22700 | вотн | 8/6/2001 | 4/25/2002 | 8/29/2002 | 8/29/2002 | 9/12/2002 | 10/28/2002 | 11/15/2002 | 11/15/2002 |
| 10/31/2001 | 7345-05 | Makapala Explora | Hawaii DWS | C-22700 | | вотн | 11/16/2001 | 3/6/2002 1 | 1/15/2002 | 11/15/2002 | 12/11/2003 | | | |
| 11/5/2001 | 0918-03 | Aloha Mana | Illya Hendrix | C-22700 | | вотн | 11/16/2001 | 12/20/2001 | 6/13/2002 | 6/13/2002 | 6/25/2002 | | | |
| 1/23/2002 | 0419-04 | CCK 1 | Calvary Chapel Kauai | C-22700 | | вотн | 1/30/2002 | 3/13/2002 | | | | | | |
| 7/1/2002 | 1120-40 | Waldau | Peter Waldau | C-22700 | | вотн | 7/5/2002 | 10/31/2002 | 5/27/2003 | 12/18/2003 | 12/29/2003 | 2/18/2006 | 2/22/2006 | |
| 1/9/2003 | 4157-13 | Kii Wildlife 4 | Campbell Estate | C-22700 | | вотн | 1/27/2003 | 2/4/2003 | 4/16/2004 | 4/16/2004 | 5/4/2004 | | | |
| 8/11/2003 | 0321-02 | Allen | Greg Allen | C-22700 | | вотн | 8/25/2003 | 10/26/2004 | | | | | | |
| 1/14/2006 | 1233-01 | Wainiha Jodan | Dane Smith | C-22700 | C-22700 | вотн | 1/26/2006 | | | | 1/26/2006 | | | |

From: <u>Jason Kagimoto</u>

To: <u>CleanWaterBranch</u>; <u>Wong</u>, Alec Y

Cc: Kurano, Matthew; Miyashiro, Scott S; Tubal, Randee; Teixeira, Bobbie; Troy Tanigawa; Donn Kakuda; Cale

Fernandez; Jon Nakashima; Wailua Waste Water

Subject: [EXTERNAL] Compliance Evaluation Inspection (CEI) Report Response, NPDES Permit No. HI 0020257, Wailua

VWTP

Date: Monday, December 14, 2020 1:30:19 PM

Attachments: 20201214 CEI Report Reponse - Wailua WWTP.pdf

Alec,

The County is submitting our response to the CEI report for the Wailua WWTP, NPDES Permit No. HI 0020257. Please see the attached.

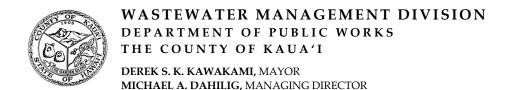
Thank you for the opportunity to review the report and respond.

Feel free to let me know if you have any questions.

Mahalo.

Jason Kagimoto, P.E.
Wastewater Management Division
County of Kaua'i, Department of Public Works
4444 Rice Street, Suite 275
Līhu'e, Kaua'i, Hawai'i 96766
(808) 241-4083
ikagimoto@kauai.gov

EXHIBIT "I-98"



TROY K. TANIGAWA
ACTING COUNTY ENGINEER

MICHAEL H. TRESLER
ACTING DEPUTY COUNTY ENGINEER

December 14, 2020

Mr. Alec Wong Hawai'i State Department of Health Clean Water Branch 2827 Waimano Home Road Hale Ola Building, Room 225 Pearl City, HI 96782

SUBJECT: COMPLIANCE EVALUATION INSPECTION (CEI) RESPONSE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

PERMIT NO. HI 0020257, WAILUA WASTEWATER TREATMENT

PLANT (WWTP), KAUA'I, HAWAI'I

Dear Mr. Wong:

This letter provides the County of Kaua'i, Department of Public Works, Wastewater Management Division's (County's) response to findings noted in the October 30, 2020 Compliance Evaluation Inspection (CEI) Report for the Wailua Wastewater Treatment Plant (WWTP). The Wailua WWTP is operated pursuant to the requirements of the County's National Pollution Discharge Elimination System (NPDES) Permit No. HI 0020257.

The subject CEI was performed on September 16-17, 2020 by the Department of Health, Clean Water Branch (DOH CWB). The DOH CWB transmitted the CEI report, dated October 30, 2020, for the County's review and response. This letter provides the County's response to the CEI report findings. Additionally, this letter provides correction and clarification comments on information presented in the CEI report.

In the main body of the transmittal letter, the DOH CWB provided a comment after reviewing the Discharge Monitoring Reports (DMRs) during the inspection. For clarity, the finding is presented in italics followed by the County's response.

The DOH would like to clarify that the WWTP is only required to report on NPDES permitted parameters only for the days/times when the WWTP is actively discharged through the outfall. The WWTP does not need to report flow and results for days that the plant does not discharge through the outfall.

County Response

Thank you for clarifying that we are only required to report on NPDES permitted parameters for the days/times when the WWTP is actively discharged through the outfall.

I. RESPONSES TO CEI INSPECTION FINDINGS

The CEI report identified six (6) items in the Inspection Findings section. For clarity, the inspection findings are presented in italics followed by the County's response.

Self-Monitoring Program:

1. Standard Conditions, Part 9 of NPDES Permit No. HI 0020257, establishes annual monitoring requirements for Outfall Serial No. 001.

Potential Violations: I reviewed DMR results for November 2019-July 2020 as a component of the inspection. Recent effluent violations were also discussed with Facility representatives. The Facility experienced the following recent effluent violations for BOD, and enterococcus at Outfall Serial No. 001.

| Date | Parameter | Limit | Limit Type | Result |
|---------------|-------------|------------|-----------------|------------------|
| February 2020 | BOD | 30 mg/L | Monthly Average | > 9 mg/L |
| March 2020 | Enterococci | 7,150 | Daily Maximum | 8,065 CFU/100 mL |
| | | CFU/100 mL | | |

In the February 2020 DMR, the permittee reported the data qualifier ">" or "greater than" for the DMR value which caused ICIS to evaluate this as a non-compliance since it's above the permit limit of 30 mg/L. In addition to the DMR exceedances indicated above, the Facility also failed the Whole Effluent Toxicity (WET) test in August 2020. The Facility is currently following its Initial Investigation Toxicity Reduction Evaluation (TRE) workplan to determine the cause of the failed WET test.

County Response

In reviewing the data for the February 2020 DMR, the data qualifier ">" or "greater than" for the monthly average effluent BOD was incorrectly used. The monthly average effluent BOD should have been "=" or "equal to" 9.0 mg/L. The monthly average effluent BOD for February 2020 was in compliance. Sorry for the data entry error.

The exceedance of the daily maximum enterococci in March 2020 is confirmed.

For the failed August 2020 WET test, the County entered accelerated monitoring per the TRE workplan, which consisted of performing 6 WET tests over the following 12 weeks. None of the 6 accelerated monitoring WET tests failed. The County has returned to routine WET monitoring.

2. NPDES Permit No. HI 0020257, Part A. Effluent Limitations and Monitoring Requirements – Part 1, footnote 2, states, "The Permittee shall monitor and report the average monthly, average weekly, and maximum daily flow."

Observation: The Permit and associated effluent limitations assume continuous flow through the Outfall and are based on the Facility's maximum design flow. Because the Facility discharges through the outfall on an intermittent basis, it is only required to report influent and effluent data for the parameters sampled when the Facility is actively discharging to Outfall Serial No. 001. The DOH must clarify reporting expectations to address the intermittent frequency of discharges through the ocean outfall.

County Response

Thank you for clarifying that we are only required to report influent and effluent data for the parameters sampled when the Facility is actively discharging to Outfall Serial No. 001. The County will implement this on the next DMR being submitted.

3. NPDES Permit No. HI 0020257, Part A. Effluent Limitations and Monitoring Requirements – Part 1 states that BOD and TSS samples shall be collected once per week using 24-hour composite sampling.

Observation: A review of flow and sampling data from December 2019, February 2020, and June 2020 indicate that 24-hour composite flow values are used to calculate the weekly and monthly BOD and TSS loading values reported on the DMRs. The loading calculations are consistent with the NPDES Self-Monitoring System User Guide, EPA Document number 883B85100 (1985).

County Response

Thank you for confirming.

4. NPDES Permit No. HI 0020257, Part A. Effluent Limitations and Monitoring Requirements – Part 1, footnote 5, states, "At least one sample shall be collected every fifth day of a 30-day sampling period. Enterococci results shall be reported as geometric mean and as a single sample maximum.

Observation: A review of DMRs and conversations with Facility representatives indicate that the Facility currently includes Enterococci sample results for samples that do not get discharged through the Outfall Serial No. 001 in order to meet the sampling and reporting requirements as specified in the permit. The DOH needs to clarify that the reportable limits for NPDES permitting purposes only apply to the discharge through Outfall Serial No. 001.

County Response

Thank you for clarifying that enterococci samples shall be collected every fifth day in which the outfall is being used (and not every fifth calendar day whether or not the outfall is being used). The County will implement this on the next DMR being submitted.

Permit Review and Storm Water:

1. NPDES Permit No. HI 0020257 was reviewed as part of the inspection process.

Potential Violation: Stormwater was not reviewed during this inspection, as the Facility is not currently authorized to discharge stormwater. The Permit Fact sheet states that the Facility does not discharge industrial storm water from the site, however it appears that the potential to discharge storm water from the Facility is high due to the rainfall in that area and the grade of the Facility.

County Response

The County was unaware that the Facility was not authorized to discharge stormwater. The County will review the site and will work with the Department of Health, Clean Water Branch on how to best address this with either site improvements/best management practices (BMPs) or a permit modification.

Facility Site Review:

 Standard Conditions, Section 9 of NPDES Permit No. HI 0020257, requires the Permittee to, "at all times properly operate and maintain all facilities and system of the treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also include adequate laboratory controls and appropriate quality assurance procedures.

The information gathered during conversations and photographic documentation indicate the level of efficiency or operability of the treatment units or overall treatment system. The observations are described below:

a. **Influent Flow and Characterization:** Influent flow is quantified with laser flow meters and characterized through samples collected at the headworks (Photograph 3).

County Response

No comment necessary.

b. Aeration Basins: The aeration basins showed that both of them appeared to be in good working order during the time of inspection, as was evidenced by the even bubble distribution (Photograph 4). This was an improvement from the previous inspection conducted on November 17, 2017, which showed signs of uneven aeration.

County Response

No comment necessary.

c. **Secondary Clarifiers:** During the inspection, one of the two secondary clarifiers were in use. A small amount of floc and solids were observed on the surface of the secondary clarifier in operation (Photographs 5, 6). Mr. Kagimoto stated that the plant is currently operating one of the two secondary clarifiers to meet the needs of the reduced flow volumes that the Facility currently receives.

County Response

No comment necessary.

d. **Final Effluent:** The final effluent flow volume is recorded, and effluent samples are collected with a temperature controlled ISCO sampler (Photographs 7, 8).

County Response

No comment necessary.

e. Asset Management, Preventive Maintenance, and Corrective Maintenance Tracking: The previous inspection (2017) identified that Facility operations relied heavily on institutional knowledge for plant operations. At that time, Facility representatives stated that the Facility was understaffed, and that much of the staff were new employees. Since then, the Facility has provided training and has developed an operations guidelines manual (dated July 2019) for use by Facility staff. The training materials developed for the plant operators, as well as the attendance logs for the operator trainings conducted by Kennekdy/Jenks Consultants was provided by Mr. Kagimoto and reviewed as part of the inspection process.

In addition to the recent staff trainings, Mr. Kagimoto stated that the Facility has implemented an asset management software program that includes each of the Facility's assets and could create work orders for maintenance activities. According to Mr. Kagimoto, the Facility has been historically underfunded, but is now fully staffed and has begun to make

improvements to their asset management, preventive maintenance, and corrective maintenance tracking.

County Response

The County concurs that the recent trainings provided for our operators with the support of the DOH has been really beneficial for our operators. It should be clarified that the County already had an asset management software program prior to the previous inspection. The program included the Facility's assets and created work orders. However, as a result of the 2017 CEI inspection, there has been more emphasis on how to optimize the use of the asset management software program and that has been beneficial to the overall operation and maintenance of the Facility.

II. CORRECTIONS AND CLARIFICATIONS TO THE CEI REPORT

The County noted several items in the CEI Report that should be corrected or clarified. The following corrections and/or clarifications are presented for consideration by the DOH CWB:

1. Facility Description, Page 3 – "information collected by the SCADA system is fed directly into Net DMR".

The information used to populate and submit the required data for each monthly DMR is obtained through various methods including sampling and compiling data (e.g. flow data) recorded and stored in our SCADA system. Although it was likely not the intention to state that SCADA automatically populates data in Net DMR, the County would like to clarify that data compiled in SCADA is manually input into Net DMR in addition to other required data which requires computation before being manually input into Net DMR.

2. Self-Monitoring Program, Page 4 – "effluent samples for Outfall Serial No. 001 are collected from the chlorine contact tank, prior to the effluent weir".

The County would like to clarify that samples are taken immediately downstream of the effluent weir as the treated effluent cascades from the weir.

The County appreciates the opportunity to review and respond to the CEI report and address comments and concerns. The County is committed to continuing to improve our facilities and operations and looks forward to future inspections.

CERTIFICATION:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions, please contact me at (808) 241-4083 or jkagimoto@kauai.gov.

Very truly yours,

CONCUR:

JASON KAGIMOTO, Chief Wastewater Management Division

TROY TANIGAWA, Acting County Engineer Department of Public Works



Chapter 7

O Ka mea ukuhi ka I ike I ka lepo o ka wasi; o ka mea inu 'a'ole 'oia I 'ike "He who dips knows how dirty the water is, but he who drinks does not. He who does the work knows what trouble it takes, he who receives it does not."

Sewage treatment and Polluted Runoff

Human waste is not a subject discussed with ease or finesse, yet it is an unavoidable byproduct of human existence that can contaminate the surrounding environment and water systems if not disposed of in a safe and deliberate fashion. Within traditional Hawaiian culture, the disposal of human waste was treated with extreme care, associating it with a number of kapu to protect the purity of Hawai'i's water. It was forbidden to relieve oneself in any of the natural water sources, including streams, wetlands, and the ocean. So, on long outrigger canoe voyages, detailed ceremonies were performed to absolve the travelers for tainting the respected resource.

The Point about Point Source

Today, the City and County of Honolulu treats about 113 million gallons a day of wastewater. When this effluent is emitted from a pipe or some other identifiable point of discharge, it is termed point source pollution. Although the term often conjures up ugly images of brown sewage pouring into the ocean from a large, rusty pipe, this is rarely the case. Wastewater is generated from many sources including agricultural processing, industrial facilities, military outfalls, and sewage treatment plants, each with unique properties of contamination. Most of Hawai'i's wastewater comes from industrial sources, generated from cooling water, metal cleaning waste, and power generation stations. Sewage and, to a lesser extent, agricultural wastewater make up the rest.

Hawai'i has seven major wastewater treatment plants that discharge into coastal waters. Sand Island with a design capacity of 82 million gallons per day and Honouliuli at 38 million gallons per day are the two largest and they serve the urban metropolitan region on Oahu's south shore. These two offer advanced primary treatment, below the required secondary treatment mandated by the U.S. Environmental Protection Agency. Sand Island and Honouliuli, as well as Wai'anae, Kailua, and Hilo wastewater plants all discharge in waters below 130 feet depth. It is widely believed by scientists that this is sufficient to prevent sewage from returning to the coastal area, though there have been challenges to this. Three outfalls are located in water shallower than 130 feet and these are located at East Honolulu, Ft. Kamehameha, and Wailua (Kauai). Other than Sand Island and Honouliuli all sewage is treated to the secondary level.

That is all well and good but the question on most of our minds is, "What happens after you flush?"

What Happens After you Flush?

After you flush, you have liquid waste, solid waste, toilet paper and other paper products, various types of medicines, cleaners, and other synthetic chemical compounds all carried by gravity into a buried pipe under your street. This toxic brew combines with the sewage of your neighbors and is carried by gravity, aided by pumps, to the closest sewage treatment plant. There, your tax dollars pay for it to be processed into a form that can be disposed of. This process consists of *primary treatment*, secondary treatment, and in some cases *tertiary treatment*.

All of these methods of treatment are used in Hawai'i. The City and County of Honolulu, responsible for the largest portion of the state's population, has six plants using secondary treatment: Kailua, Wahiawa, Kahuku, Wai'anae, Waimanalo, and Pa'ala'a Kai wastewater treatment plants. At these locations, treated wastewater is injected into the ground, discharged into a lake, or discharged into the ocean. These discharges return the water and left-over impurities for recycling back into our ecosystem. Honolulu has two plants using advanced primary treatment. These are the Sand Island and Honouliuli wastewater treatment plants that process sewage for the urban core in Honolulu and the Ewa Plain. These two plants treat most of the wastewater (more than 85%) generated on the island of O'ahu.²

When your treated sewage is discharged into the sea, it is assumed that it is harmlessly diluted in the immense volume of the Pacific Ocean. Ground disposal assumes that by flowing through island bedrock, our waste water is adequately purified. Behind these steps lays the recognition that in the ideal world of a closed ecosystem there is no such thing as waste. Just about everything organic (meaning a carbon compound made by a living organism) is eventually recycled. For example, as animals exhale carbon dioxide, plants use this gas and water in the process of photosynthesis to make their food. Plants thrive on natural fertilizer from the droppings of animals and in return provide food to the animal kingdom as well as oxygen to breathe. Nutrients, water, and carbon are constantly being recycled through the ecosystem.

The treatment of wastewater from humans borrows this natural recycling. The most popular wastewater treatment methods (secondary treatment, mandated nationwide by the federal Environmental Protection Agency under the Clean Water Act) are simply amplifications of what occurs naturally.

Wastewater Treatment

Treating wastewater consists of several steps, and most treatment facilities employ a unique blend of several methods to best suit their needs. All sewage goes through *preliminary treatment* when it enters a facility. Preliminary treatment is a mechanical process with the goal of removing physical objects and grit from the wastewater. Sewage arriving from neighborhood pipes is run through large screens, grinders, and grit channels to catch physical materials such as rags, large food items, sand and stones, and other garbage.

The next step is *primary treatment*, which relies on physical separation to remove solids from the wastewater. This mostly involves letting water slowly move through large sedimentation basins to permit fine solids and organic compounds to settle to the bottom or float to the top. Mechanical scrappers and belts clear the "sludge" from the bottom of the tank while slowmoving rakes cross the surface and remove floating "scum". Scum includes grease, oils, plastics, and soap (compounds lighter than water, hence they float). Scum is thickened and pumped along with the sludge to enclosed heated tanks called digesters. There, solids are kept for twenty to thirty days while bacteria digest organic material, reducing its volume and odors, and getting rid of some of the organisms and compounds that may cause disease. The finished product is mainly sent to landfills but sometimes can be used as fertilizer.³



A pair of aeration tanks at a wastewater facility.

Secondary treatment employs mostly biological processes to remove much of the remaining dissolved and microscopic organic matter. Several different techniques are used to achieve this. One common type is the activated sludge system that consists of two parts, an aeration tank and a settling tank, or clarifier. The aeration tank contains a culture of bacteria, protozoa, fungi, and

algae that is constantly mixed and aerated with compressed air or large mechanical mixers. Wastewater enters the tank and mixes with the culture, which uses organic compounds in the sewage for growth - producing more microorganisms - and for respiration, which results mostly in the formation of carbon dioxide and water. Both growth and respiration destroy organic compounds in wastewater using the natural metabolism of the bacteria. The process can also be set up to provide biological removal of the nutrients nitrogen and phosphorus.

After sufficient aeration to reach the required level of treatment, wastewater flows into the clarifier. Once there, sludge settles to the bottom of the tank producing a reasonably clear upper layer that is removed and discharged, or further treated.

Other techniques can be employed to further purify the water with chemical treatment, filtering, and radiating the water in ultraviolet light to kill bacteria.⁴ Clarified wastewater may flow into a "chlorine contact" tank, where the chemical chlorine is added to kill bacteria, just as is done in swimming pools. The chlorine is mostly eliminated as the bacteria are destroyed, but sometimes it must be neutralized by adding other chemicals. This protects fish and other marine organisms that might be harmed by the smallest amounts of chlorine when the treated wastewater is discharged.

Sometimes cities also use filtration in sewage treatment. After solids are removed, liquid sewage is filtered through a substance, usually sand, by the action of gravity. This method gets rid of almost all bacteria, reduces turbidity and color, removes odors, reduces the amount of iron, and removes most other solid particles that might remain in the water. Water is sometimes filtered through carbon particles, which is also effective at removing organic matter.

Combined primary-secondary treatment removes about 97% of suspended solids, 95-97% of oxygen-using organic waste, 70% of most toxic metal compounds and non-persistent organic chemicals, 70% of phosphorous, 50% of nitrogen, 5% of dissolved salts. However, only a small percent of persistent chemical compounds such as pesticides are removed.

Less than Perfect

The federal government plays a significant role in regulating the discharge of point source pollution through the Clean Water Act (CWA) of 1972. The Act's primary goals are to ensure that all waters in the United States are clean enough for fishing and swimming and to end all discharges of pollutants into navigable waters. The National Pollution Discharge Elimination System (NPDES) – part of the CWA – requires all dischargers to have permits, and mandates all publicly owned treatment facilities to achieve secondary treatment of effluent to protect public health.

In 1977, Congress amended the CWA to allow municipalities to discharge at less than secondary standards if they established that it would not harm the environment. This stipulation has received widespread attention across the Hawaiian Islands because our two major sewage plants, Sand Island, and Honouliuli, seek to remain at the level of primary treatment due to the great expense of upgrading, and because it is thought that dilution in the deep water adjacent to our islands is sufficient to mitigate potential health and environmental impacts. Experts, and the court of public opinion, continue to debate whether the high levels of nutrients, suspended solids, organic matter, and industrial chemicals in primary treated effluent pose a threat to sensitive marine habitats. Likewise, opinions vary with regard to the potential health impacts of effluent

dumped in the deep waters offshore of island beaches. But our major treatment facilities are slowly improving the quality of water that makes its way into the oceans as they add components such as disinfectors, larger digestion facilities, and upgrades to sewage delivery pipes beneath our streets.

Poised for battle is the Environmental Protection Agency (EPA), pressuring Hawai'i to treat all sewage to the secondary level, while the City of Honolulu struggles to convince them that appropriate treatment standards and disposal guidelines specific to its unique mid-ocean environment should be exempt from the CWA. Because of the CWA, most U.S. cities have combined primary and secondary sewage treatment plants.

To reduce the environmental and public health risks associated with primary wastewater effluent, managers have three basic options at their disposal: improve the treatment level, change the discharge location, and upgrade the facilities' operation to minimize leakage and emergency bypassing of untreated water due to flooding during rainstorms. Each, or all, of these steps will lessen the negative environmental impacts related to sewage discharge; and each has been employed in the Hawaiian Islands.

The Hawai'i Department of Health monitors locations where public wastewater treatment plants discharge into Hawaiian ocean waters. These are listed below with their average dry season discharges in millions of gallons per day (mgd).

1. Island of Hawai'i -

- a. Hilo Wastewater Treatment Plant (secondary) 5 mgd
- b. Kulaimano Wastewater Treatment Plant (secondary) 0.1 mgd
- c. Papaikou-Paukaa Wastewater Treatment Plant (secondary) 0.09 mgd

2. Kaua'i

a. Wailua Wastewater Treatment Plant (secondary) – 1.5 mgd

3. O'ahu

- a. East Honolulu Wastewater Treatment Plant (secondary) 4 mgd
- b. Fort Kamehameha Wastewater Treatment Plant (secondary) 13 mgd
- c. Kailua Regional Wastewater Treatment Plant (secondary) 15 mgd
- d. Sand Island Wastewater Treatment Plant (advanced primary) 82 mgd
- e. Waianae Wastewater Treatment Plant (secondary) 5 mgd
- f. Honouliuli Wastewater Treatment Plant (advanced primary) 38 mgd

The advanced primary treatment being performed at Sand Island and Honouliuli are controversial. Both plants have been granted waivers under the Clean Water Act to legally discharge sewage treated at the primary level. Upgrades at the Sand Island plant allow it to operate with increased capacity, as much as 90 mgd, and to provide ultraviolet disinfection, improved filtering, and recycling of treated sludge into fertilizer pellets. Extension of sewage outfalls at Sand Island and Kane'ohe Bay from shallow water to deeper water in the 1970's and 1980's has resulted in significant improvements with regard to seafloor ecology and human health concerns. Outfalls, placed far enough out to sea, benefit from oceanic currents that carry sewage offshore, trap it below a thermocline (temperature boundary), and otherwise mix the waste in the vast cauldron of the ocean. But is this sufficient?

The EPA says "no", citing studies done in March 2007 at both Honouliuli and Sand Island of bacteria levels that were higher than national standards to protect swimmers, surfers, and others from gastrointestinal diseases. Effluent from both plants was tested to determine impacts on sea urchin fertility. Results indicate the production of excess ammonia that may harm other aquatic organisms. Samples from both plants also contained excess levels of two pesticides, dieldrin and chlordane. 10 The City and County of Honolulu says "yes", citing the enormous cost of retrofitting to secondary treatment (\$1.2 billion) as unaffordable and pointing to Hawai'i's unique position in the Pacific ocean that renders secondary treatment unnecessary. They fought the EPA with a battalion of scientists who testified that the use of sea urchins as a telltale was inappropriate, pesticide measurements fell within acceptable guidelines, and the ammonia measurements were contradicted by real-world evidence. Over the course of four public hearings, not a single scientist or engineer familiar with the system testified that denying the CWA waiver would result in any environmental benefit. The City also argued that the money would be better spent upgrading the county's sewage collection pipes. 11 Holes in this delivery network are a main source of non-point source pollution that enters our coastal ocean and groundwater system.

Facility Improvements

Though treatment standards for wastewater and disposal location are both important factors dictating the environmental impacts of wastewater, facility operations and maintenance problems have been at the heart of many water quality violations in Hawai'i. The Clean Water Act played a key role in improving facility-level operations across the United States, beginning in the 1970's. The CWA not only imposes financial penalties when violations occur, but the federal government also offers a carrot of financial assistance for facilities that desire to improve their operations.

During the 1970's, federal funds were made available, under a Construction Grants Program, to build municipal wastewater treatment plants. 12 Through this program, the net cost of building or upgrading facilities in Hawai'i significantly decreased from their original cost. Maui capitalized on the opportunity, and as a result, all of its sewage is treated to the secondary level and disposed of using injection wells located in coastal areas below potable aquifers, rather than through ocean outfalls. Kaua'i also seized the opportunity to upgrade its treatment facilities, recognizing that the island's increasing population could overburden its aging systems. The County of Hawai'i used federal construction grant money to expand and even over-build their plants, making them operate considerably below their capacity. However, wastewater treatment on the Big Island is not without its problems. The Kealakehe Wastewater facility in north Kona has no disposal unit. It discharges a daily load of 1.5 million gallons of wastewater directly into Honokohau Harbor on the Kona coast. This is a major problem that has no parallel on the other islands.

Wrestling with Outfalls

In the last decades of the 20th Century, heightened public awareness, a rash of federal waterquality violations, and several notorious and lengthy lawsuits prompted the placement of outfalls deeper in the ocean and farther offshore. Studies associated with these lawsuits have highlighted Hawai'i's deep water location, ideal in many ways for rapid diffusion of pollutants provided it can be established that effluent-carrying currents are not delivering waste to bathing waters or sensitive ecologies.

The problem is that environmental politics sets different standards for different people. No scientific study is failsafe and absolute. All have built-in assumptions and under-sampling of the desired information. Depending on your inclination, two people may view the same study in a very different light. One person's thorough study is another person's flawed research. Hence in the politics of environment, environmentalists remain skeptical that our outfalls are safely located and not impacting nearshore water quality. They continue to call for wastewater treatment to the secondary level at all facilities, and there are experts that back their opinions.

With fewer people inhabiting the outer islands, their wastewater dilemmas have not reached the same boiling point as on O'ahu. In the past, treatment plants have only been built when population density has reached a critical mass and public concern erupts. On Kaua'i, there are only four treatment facilities, all of which treat their sewage to the secondary level and the majority of this water is used for golf course irrigation now. Due to the island's former character of intense agricultural production and sparse population, farming waste comprises a larger proportion of Kaua'i's wastewater than any other island – but that is changing in the 21st Century. The more rural islands of Moloka'i and Lana'i have only a few point source dischargers, including a handful of agriculture processing plants, and a number of resorts that dump primarily treated wastewater into the ocean.

Improvements to Sand Island

In the late 1990's and early this century the City and County of Honolulu spent hundreds of millions of dollars on improvements to its largest sewage treatment plant, Sand Island. The Sand Island Wastewater Treatment Plant services an area stretching from Kuliouou Valley on the East side of Honolulu to Aliamanu on the West side of Honolulu. The facility diverts sewage from the city of Honolulu into the sea with advanced primary treatment. However, with deteriorating infrastructure, upgrades to the plant equipment have been necessary in order to correct federal Clean Water Act violations. These include:

- •expansion of capacity from 82 million gallons per day (mgd) to 90 mgd;
- •increased wet weather capacity from 210 mgd to 270 mgd;
- •introduction of an ultraviolet disinfection system to reduce pathogenic organisms;
- •construction of new main lines, pumps, and delivery/receiving components for sewage;
- •refurbishing clarifiers, new screening channels, new aerated grit chambers;
- •installation of biofilter trickling filters and carbon scrubbers to reduce hydrogen sulfide gas emissions. 13

Despite these corrections, however, the plant continues to operate at the advanced primary level and, in the past, the U.S. Environmental Protection Agency has threatened to revoke permits to operate the plant if it is not upgraded to the level of secondary treatment.

Offshore discharge of treated sewage has improved since 1972 when sewage from Honolulu, amounting to about sixty-two mgd, was being discharged off Sand Island at a depth of thirtyeight feet. 14 The discharge was raw sewage, totally untreated, and thick sludge deposits accumulated on the seafloor with measurable impacts to the reef community. The ocean surface was marred by an ever-present thick, grayish-brown plume usually heading in the direction of Ewa Beach and Barbers Point. During calm winds the sewage was carried toward the shore and could be found at Ala Moana Beach Park. Studies revealed that viruses from the discharge were being carried into recreational waters.

By 1976, Sand Island had installed a new seventy-eight inch diameter outfall that extended about 1.5 miles offshore where the ocean was 225 to 240 feet deep. 15 The new outfall was designed with a long diffuser section to discharge sewage over a greater length of the seafloor. The combined effect of extending the outfall, the diffuser head, and upgrades in treatment level at the plant have considerably improved water quality and virtually eliminated impacts to the seafloor ecology.

The diffuser heads distribute wastewater across a wider area of the seafloor. Instead of discharging sewage in one big mass from the end of a pipe, the outfall at Sand Island has a 3400foot long diffuser section with 282 openings, ranging from 3 to 3.5-inches in diameter and spaced twenty-four feet apart. This way sewage is discharged in small amounts from each port and spread out over the length of the diffuser. The County monitors bacteria levels, micromollusk populations, over 64 chemicals in the flesh of fish caught in the area, abnormal growths in the livers of fish caught in the area, nutrient levels (nitrogen, phosphorus), chlorophyll levels (related to algae growth), turbidity, temperature, and properties of the sand and sediment from the sea floor. The data from these tests help to determine how the ocean environment is changing and whether the wastewater discharge is having any effects. ¹⁶

East Honolulu and Kāne'ohe

In 2002, a study of the Sand Island and East Honolulu sewage outfalls by researchers at the University of Hawai'i found: 1) an area off Sand Island that was essentially destroyed when the discharge was located in about thirty-five feet of water has fully recovered to the same level as nearby natural ecologies now that the outfall has been relocated below 200 feet depth, and 2) discharge from East Honolulu at Sandy Beach has negligible effect on reef communities, but the communities are continually oscillating in coral abundance as a result of periodic large storm surf from the east. 17

During the 1970's, Kāne'ohe Bay's marine organisms suffocated under a deluge of sewage being dumped daily into the nearshore environment. In response to the community's outrage over such environmental negligence, a new deep-water outfall was completed in 1977 to divert sewage into the open ocean off of Mōkapu Peninsula on the outskirts of Kailua Bay. It took two years for visible improvements in the water quality, and evidence suggests that the reef-based community is recovered and thriving.¹⁸

Injection Wells – A Common Way to Get Rid of Waste

Still the most common method for disposing wastewater in Hawai'i is through the injection well. Wastewater injected into the ground becomes part of the groundwater system, and eventually discharges into the ocean. Along the way dilution and chemical processes can reduce the nutrient load.

Managing the location of injection well sites is based on a simple map (an underground injection control map, or UIC) of each island that outlines the periphery of salty groundwater levels around the islands and the location of drinking water aguifers. Most injection wells are drilled close to shore, based on the assumption that treated effluent will mix with the salty groundwater and not threaten potable aguifers. The basic operating principle behind an injection well's location is to protect drinking water from any possible contamination. This responsibility belongs to the wastewater plant using the well or the County, which oversees wastewater treatment. Yet one may question whether we have sufficient understanding of the details of each island's subsurface geology to know where to safely place these wells. Over the years, compliance with federal and state regulations has decreased, which has led to discussions on implementing more stringent regulations of injection well locations.

Subsurface injection wells can also pose problems for Hawai'i's environment. First, a percentage of injection wells experience problems such as clogging, with over half of O'ahu's monitored injection wells periodically or continuously overflowing. Secondly, if the well's effluent migrates far from the site without a sufficient amount of dilution, potable groundwater and coastal waters might become contaminated. Groundwater flows from the mountain to the shore carrying a background nutrient load from the adjacent watershed. As this water moves beneath urbanized lands along the coast it picks up additional nutrients from nonpoint sources such as fertilizers, septic systems, and leaks in the sewer system. Wastewater injection at treatment plants adds to this load that potentially enters the ocean. With this possibility in mind, the USGS conducted a study of the effluent from one injection well on the Kihei coast of Maui¹⁹. While they are careful to point out that the study only focused on one well, results indicated that the nutrient load was considerably attenuated (reduced) during flow through the permeable coastal zone. They found that despite this attenuation nutrient flux was 3.5 times the background flux for both nitrogen and phosphorous. Compared to Big Island Golf courses, the nitrogen flux was one-half to one-third in the Kihei study.

Crumbling U.S. Sewage System

The mainland has a million mile network of sewage collection pipes and pumps designed to carry over fifty trillion gallons of raw sewage daily to some 20,000 treatment plants. But parts of this complex and aging infrastructure are crumbling resulting in spilled sewage entering neighboring groundwater, watersheds, and even homes. Hawaii is included in this pattern and many are of the opinion that fixing this aging infrastructure in the islands is the most important priority. This pollution poses a health risk to communities across the nation. Spilled, discharged, and leaked pollution costs Americans billions of dollars every year in medical treatment, lost productivity and property damage.

A statement by the Association of Metropolitan Sewage Agencies says the Congressional Budget Office, the Government Accounting Office, and the EPA all agree there is a national

funding gap estimated to be as high as \$1 trillion for upgrading water infrastructure. ²⁰ Researchers found in 2001 there were 40,000 sanitary sewer overflows and 400,000 backups of raw sewage into basements.²¹ The EPA estimates that 1.8 million to 3.5 million individuals get sick each year from swimming in waters contaminated by sanitary sewage overflows.²²

A large part of the problem is one of aging infrastructure, some pipes still in use are almost 200 years old, although the average age of collection system components is between thirty and forty years. Federal officials predict that without substantial investment in the nation's sewage infrastructure, by 2025 U.S. waters will again suffer from sewage-related pollutant loadings as high as they were in the record year 1968.

Hawai'i's Sewage Transport System

Hawai'i's sewage transport system mirrors problems across the nation. While the 1980's were spent attempting to resolve many sewage disposal problems with relocated outfalls, the 1990's verified that Hawai'i's antiquated delivery and transmission system was one of the biggest contributors to sewage-based pollution. And in early 2006 this was brought to appalling relevance with the largest sewage spill in state history – forty-eight million gallons of raw untreated human sewage were dumped directly into the Ala Wai Canal to prevent it from surging out of toilets and sinks into hotel rooms and apartments throughout Waikiki. 23 That same week another 1.85 million gallons of raw sewage spilled into Hawaiian waters in smaller spills located at half a dozen other sites around O'ahu. One man who fell into the sewage-laden canal died a week later of massive infections that included a form of flesh-eating bacteria, although his case was compounded by additional factors.

Raw sewage spills, leaks in pipelines, plant level problems, sewer-line blockages, structural failures from corrosion, sewage infiltration to groundwater, groundwater infiltration to overwhelmed treatment facilities, limits in sewer line capacity, and poor maintenance programs, together with Hawai'i's moist environment, have created a persistent and pervasive water quality hazard on O'ahu. As more sewer lines are added and the entire system continues to age, the likelihood of problems increases. The majority of the state's lines were installed between the 1930's and 1950s, while some of O'ahu's most decrepit pipes are approaching 100 years old.

Each county owns, operates and maintains their sewer collection system, while budget constraints commonly limit the amount of attention the counties give to these systems. With more than 2,000 miles of sewer lines dug beneath the soil of O'ahu and lesser amounts on neighboring islands, the challenge of monitoring and maintenance is daunting. A flurry of bypass and overflow events that accompany every heavy rain are proof enough to warrant the vigorous and unending upgrade of facility level operations. Indeed, this refrain is not new to the ears of county managers as sewerage upgrades perennially top the list of major expenditures in county budgets. However, the combination of making up for past neglect, keeping up with ever expanding housing growth, and getting out in front of the ever-aging infrastructure proves to be a daunting task.

The federal government ordered a major overhaul of Honolulu's ailing sewer system, blamed for at least 200 spills, overflows, and bypasses, in the 1990s. ²⁴ In 1999, O'ahu embarked on the ambitious mission of upgrading 1,800 miles of sewer pipes. However, by 2008 the U.S. Environmental Protection Agency proposed to not renew Honolulu's permit variance to exempt the Sand Island Wastewater Treatment plant from full secondary treatment requirements. While

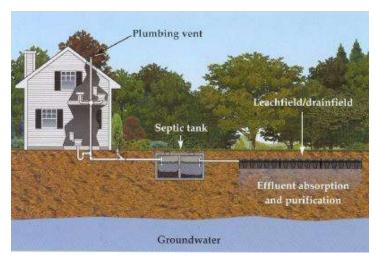
the case continues to play out in court, if the variance is denied, Honolulu may have to spend as much as \$1.2 billion to upgrade the plant. There is good news however; Honolulu's Department of Environmental Services announced in mid-2008 that sewage spills were down for the secondstraight quarter. Records show 20 spills from gravity mains, lower laterals, pump stations and force mains from April 1 through June 30, 2008 This was a 51.2% reduction compared to 41 spills recorded during the second quarter of 2007. In addition to the second quarter decline, there was a 40.8 percent drop (42 to 71) in sewage spills during the first six months of 2008 as compared to the same stretch in 2007. The majority of spills were attributed to grease, roots and debris clogging pipes, as well as broken or sagging pipes and wet weather

On Kaua'i, the Lihue sewer system was expanded to 2.5 million gallons per day, allowing more properties to connect to the county system, but the network still remains inadequate for planned development. As of 2008 however, authorities had produced the Final Environmental Assessment for the 'Ele'ele Wastewater Treatment Plant Facility Plan. The plan consists of three planning intervals: near term, middle term and far term. The near term improvements will be implemented by 2010; the middle term should be in place from 2010 to 2015; the far term developments should be applied in the following 10 years leading up to 2025.

As the state's tourism population continues to skyrocket past seven million per year, however, most of the existing systems are simply not adequate to handle the increased loads. Most counties are locked into playing an expensive game of catch-up that incrementally improves their sewage system with each passing year, but is it fast enough?

Un-Sewered Land

A growing area of concern is not only the overall amount of community effluent, but how waste is managed at the household level. In the U.S., 75% of sewage is treated in municipal treatment plants while 25% is treated in household septic systems, mostly in suburban and rural areas.²⁵ A large proportion of the private property in Hawai'i, perhaps as much as 40%, is not attached to the county sewer system. Sewer systems are only installed in areas where the population reaches a level high enough to justify the cost and effort of trenching for lines, hooking individual homes and properties to pipelines, and building treatment facilities to handle the transported sewage.



The objective with septic tank sewage treatment is to retain the effluent in the septic tank for at least 30 hours. This allows time for solids to settle on the bottom and grease to float to the top. As a general rule of thumb, a two bedroom home will require a 1000 gallon septic tank; three bedroom 1250 gallon septic tank; and four bedroom 1500 gallon septic tank. All of these are minimum requirements - to some extent, the bigger the better. A longer retention time allows the solid waste more time to decompose. (www.thenaturalhome.com/ septic.html)

In much of Hawai'i, particularly in rural areas, residents are forced to deal with sewage on an individual basis. Oftentimes individuals simply dig a cess pool, nothing more than a hole in the ground, and divert raw, untreated sewage directly into the earth. The environmental risk of cesspools and septic tanks depends on what lies beneath the property, and varies from island to island. Hawai'i has the largest number of cess pools in the nation, approximately 100,000, and the greatest number per capita. However, cess pool construction has been banned on the island of Oahu and Kauai, and on Maui, Molokai, and Hawaii cess pools are only allowed in certain areas.

The alternative to septic and cesspool systems is for communities to hook up to a nearby sewer system. Unfortunately, these costs are always high, particularly in sparsely populated areas where sewer lines and centralized systems have yet to be built. In new developments, property owners incur the cost of hooking up to a public system and are also charged a monthly service fee. Communities that have enjoyed free services up until now by relying on self-supported inexpensive methods are hesitant to assume the financial responsibility of hooking up to a county system.

Monitoring Individual Systems

Monitoring of cesspools and septic systems has been a difficult and costly dilemma for the state. Ideally, the state would monitor the safety and condition of each cesspool and septic field, but rarely are funds allocated specifically for this purpose. Monitoring is made even more difficult by the fact that there are no records of how many private systems are in place, or of how much wastewater they generate.

Over time the wastewater from cesspools and septic tanks seep into the underlying substrate and frequently overflow during rainfall, generating serious public health risks. Studies by the

University of Hawai'i affirmed the suspicion that increased levels of nitrogen and phosphorus are leaching into surrounding aquifers from cesspools and septic systems. ²⁶ The problem is that wastewater engineers still disagree on how much of a threat cesspools and septic tanks pose to Hawai'i's environment and its people. Additional problems may result from septic systems located in coastal areas. Some feel that noxious algae blooms on the Maui coast (Hypnea musiformis) are at least partially feeding on nutrients coming from household systems. However, scientists studying the problem²⁷ have determined that natural nutrient levels in coastal water are sufficient to support the algae explosion and that this is a case of a new species (introduced to Maui ~20 years ago) finding a niche in the ecosystem where it enjoys relatively little competition, a low wave environment, and a broad fringing reef that supports algae growth. The problem with the noxious algae is that it should never have been introduced to Hawaii in the first place.

Today, septic and cesspool complaints are handled on a case-by-case basis, and as of now the only mechanism for improving the situation occurs when individual building permits are requested. The state still has very few courses of action in place to promote sewering for proposed subdivisions. It seems glaringly obvious that Hawai'i will need to dedicate a worthy portion of its financial resources to this problem, as it is affecting the purity of Hawai'i's groundwater, stream and coastal water, and our public health and safety.

Paving Paradise – Non-point Source Pollution

Most of Hawai'i's lowland forests are gone, having been felled by a combination of native Hawaiians and westerners for intensive agriculture and urban development. Thousands of acres of soil that once supported the native vegetation, absorbed the rain, and naturally filtered water runoff are now buried and vaulted beneath paved impermeable surfaces. As asphalt replaces forests and fields, and rainfall is forced to flow across denuded landscapes, the water degrades into polluted runoff. Once referred to as "any pollution that doesn't come out of a pipe," nonpoint source pollution is sinister in that it is diffuse and difficult to trace. Nonpoint source pollution is simply a term for polluted runoff.

As water runs across paved surfaces, it absorbs whatever lays in its path: oil, grease and toxic chemicals from vehicles, pathogens from leaking sewage systems and cesspools, chemical spills from dry cleaners, paint stores, and automotive shops, fertilizers and pesticides from lawns, animal feces, petroleum products, heavy metals, and many other undesirable compounds that make their way onto the ground surface. Unlike natural landscapes where rainwater pools in gullies and filters slowly into the ground, urbanized streets, parking lots, driveways, rooftops, and gutters divert polluted runoff into channels, culverts and storm drains all headed at high velocity into our coastal waters. This artificial maze of conduits alters the natural course of the runoff, accelerating its pace, eroding stream banks, damaging streamside vegetation, and widening channels while carrying the polluted discharge into the ocean. The potential for polluted runoff to affect coastal and marine environments is immense in Hawai'i as most of the population and its wastes reside within a few miles of the shoreline.

In places as diverse as Kona, Ka'anapali, and Pearl City, paradise is disappearing under a labyrinth of paved surfaces. Outlet malls, shopping plazas, and miles of concrete roadways are connecting spillways, storm drains and culverts, and diverting the natural flow of wai. As prime real estate becomes increasingly scarce, remnant parcels of the arid coastal plains are acquired,

and cities are created that depend on stressed water resources. Access to new development requires more roads.

The biggest determining factor of non-point source pollution is land use patterns. The state has assigned all lands into four land-use districts for zoning purposes: urban, rural, agricultural, and conservation. Water quality is diminishing in direct proportion to the pace in which land is converted under pavement. The fate of the islands' water quality is closely linked to the choices that will be made in coming years about how the vast agricultural fields will be used.

Polluted Components

One big contributor to polluted runoff is *sediment*. Derived from eroded soils, hillsides, construction sites, excavation pits, and most importantly abandoned or fallow agricultural fields, sand, silt and clay find their way into storm drains, streams, and ultimately into sensitive nearshore marine communities including reefs, fish habitats, estuaries, and other restricted shallow water environments where sediment accumulation may be harmful. Water turbidity increases where sediment loading is intense, suffocating delicate marine organisms or filling in wetlands and waterways. Although sediments are present naturally in water, any type of landdisturbing activity generally increases sediment delivery to surrounding water bodies. Few disagree that construction projects accelerate erosion, but best management practices can be adopted and enforced to minimize the damage.

Another major component of polluted runoff is derived from industrial and urban sources. Combined pollutants from roadways, vehicles, industrial facilities, oil refineries, and manufacturing plants create a lethal soup. Over the past few decades, many hazardous substances from industry have found their way into the environment through a combination of routine releases, leaks, and spills. Although regulations exist that govern the use and disposal of such substances, it's difficult to keep pace with the proliferation of new chemical compounds.

With more than 4,000 miles of roads and one million vehicles registered statewide, the residue of heavy metals from cars and trucks alone contribute significantly to non-point source pollution. In Hawai'i, tons of lead were released into the environment in 1971 from the use of leaded gasoline, and it took seventeen years until all alkyl-leads were finally eliminated. Studies suggest that lead, possibly from brake pads, is still being added to the environment. Zinc and cadmium from car tires are worn off with constant treading. Chemical runoff from homes is also significant; copper from plumbing and gutter linings seeps into storm drains. The impacts of industrialization are growing daily.

Maps of impaired water bodies are available from the Hawaii Department of Health²⁸. These areas, known as "water quality limited segments," are mapped so that practices within these regions can be monitored and regulated. According to the Environmental Protection Agency's National Water Quality Inventory 2000 Report, in Hawaii only 32% of surveyed rivers meet their designated uses, and 69% of surveyed rivers are impaired; all of the surveyed estuaries and bays in Hawaii fully support aquatic life, but only 86% fully support fish consumption and shellfish harvesting, and only 74% fully support swimming. The most significant pollution problems in Hawaii are siltation, turbidity, nutrients, organic enrichment, and pathogens from nonpoint sources including agriculture and urban runoff.

Managing Watersheds

Watersheds consist of the land traversed by run-off, stream channels and floodplains, and the coastal waters they enter. In Hawai'i, these are increasingly found to violate water quality standards set by the EPA. A list of impaired water bodies in 1998 included nineteen coastal sites and three streams. In 2002, this had risen to fifty-nine streams and 139 coastal stations exceeding federal regulations.²⁹ By 2004, the list included seventy streams and 174 coastal stations.³⁰ From 2002 to 2004 no stream or previously listed coastal station was delisted despite funding for mitigation from the State Department of Health and the U.S. EPA. Although watershed management, it appears, is losing ground to pollution every year, there are examples of individual stream systems and coastal sites where the level of degradation is improving due to community and state efforts.

The Hawaiians managed watersheds such that they lived sustainably for generations with a large community of many hundreds of thousands of people. The key to their success was that they managed the watershed as a whole system, not piece by piece. Watersheds today are managed by separate agencies primarily concerned with achieving isolated and uncoordinated mandates. The result is that over time, water quality declines, watersheds decay, and coastal water bodies accumulate pollutants.

Taking a cue from the ahupua'a system, the Department of Health (DOH) now recognizes that the fragmented management system employed in the Hawaiian Islands is failing to achieve advances in coastal water quality. Hence, DOH has combined with the Hawaii Coastal Zone Management Program, in the state Office of Planning to offer watershed planning guidance to agencies, nonprofits, industries, and neighborhood groups seeking to recover and sustain watersheds. The goal of the effort is to improve coastal water quality by reducing land-based sources of pollution and restoring natural habitats³¹. The guidance builds on the DOH coastal nonpoint pollution control program management plan (1996), implementation plan (2000), and action strategy (2004) to address land-based pollution threats³².

A Control Program

The July 2000 implementation plan published by the Department of Health Polluted Runoff Control Program recognizes that polluted runoff is a major state-wide problem.³³ The plan presents an approach for handling key elements of non-point source pollution required by the EPA to qualify for federal funding. The plan identifies polluted water bodies, "water quality limited segments," resulting from polluted runoff, many of which are coastal and estuarine environments.

Prior to 1994, Hawai'i did not have a storm water program. Consequently, storm drains and stream channels served as conduits for rapid transport, accelerating the accumulation of toxic materials in our waterways. But in 1994, the federal government initiated a change with the Non-Point Pollution Control Act. 34 With more than 300,000 residents calling the capital home, the City of Honolulu was the first city in the state required by federal law to apply for a Non-Point Source (NPDES) permit. The permit obligated the City to institute a water-quality monitoring program. Recent amendments in federal regulations call for all cities with more than 100,000 people to apply for non-point source permits.³⁵

Yet even in places where existing regulations have changed or new legislation has been passed, non-point source pollution is not being reduced as much as expected or hoped. Critics say that within the state there is ambiguity and confusion over which agency should lead the way in coordinating the various water quality programs and enforcing water quality mandates. One agency continues to channelize streams while another calls for reductions in polluted runoff. This lack of clarity among agencies means that the state has no integrated water management plan for watersheds that are included in the Department of Health's Polluted Runoff Control Program of 2000, a part of the Clean Water Branch and Coastal Zone Management Program.³⁶

This program was initiated after a 1987 federal mandate, Section 319 of the Clean Water Act, specifically addressing non-point source pollution. The program administers grants and projects that purify bodies of water impacted by non-point source pollution. Under this mandate, the federal government provides funds to state agencies for polluted runoff mitigation programs, and pushes for individual states to allocate matching funds in return. To date, Hawai'i has been very lax about contributing money towards polluted runoff alleviation, which means that the state has trouble getting the federal dollars that require matching state funds. Not only do state budget decisions determine the number and types of projects funded, but also the number of people dedicated to the issue of polluted runoff.

To quality for federal funding for its polluted runoff program, Hawai'i has successfully addressed nine key elements in its implementation plan for the polluted runoff program.³⁷ According to the EPA:

- 1. The state program contains explicit short-and long-term goals, objectives and strategies to protect surface and ground water.
- 2. The state strengthens its working partnership and linkages to appropriate state, interstate, Tribal, regional and local entities (including conservation districts), private sector groups, citizen groups and federal agencies.
- 3. The state uses a balanced approach that emphasizes both statewide non-point source programs and on-the-ground management of individual watersheds where waters are impaired or threatened.
- 4. The state program (a) abates known water quality impairments from non-point source pollution and (b) prevents significant threats to water quality from present and future non-point source activities.
- 5. The state reviews, upgrades, and implements all program components required by section 319(b) of the Clean Water Act, and establishes flexible, targeted, and iterative approaches to achieve and maintain beneficial uses of water as expeditiously as practicable.
- 6. The state reviews, upgrades, and implements all program components required by section 319(b) of the Clean Water Act, and establishes flexible, targeted, and iterative approaches to achieve and maintain beneficial uses of water as expeditiously as practicable.
- 7. The state identifies Federal lands which are not managed consistently with State nonpoint source program objectives. Where appropriate, the state seeks EPA assistance to help resolve issues.
- 8. The state manages and implements it non-point source program efficiently and effectively, including financial management.

9. The state periodically reviews and evaluates its non-point source management program using environmental and functional measures of success, and revised its non-point source assessment and management program at least every five years.

In its September 2000 review of this plan, the EPA commended the state of Hawai'i for integrating pollution control measures under the federal Clean Water Act and the Coastal Zone Act. 38 The level of public outreach and participation during the development of this plan was noted, and the Hawai'i implementation plan was described as "providing the needed framework to guide the continued development and implementation of the Polluted Runoff Program in Hawai'i."

Whether directly or indirectly, current state and county regulations address all of the coastal non-point source pollution programs and management measures. However, a lack of funding and an insufficient number of staff impedes the success of these regulations. Even in places where the program has been implemented, the measures are not reducing the inputs from non-point source pollution as much as expected. It is critical for a state agency to assume responsibility for coordinating all programs and enforcing water quality regulations, to ensure the health of our state waters.

Persistent Pesticides

As large-scale agriculture took hold in Hawai'i during the early 20th century, there was an escalating demand for fumigants, nutrients, pesticides, and fertilizers. Though groundwater sources typically rest 1,000 feet below the leeward plains, runoff from heavily irrigated fields leached downward. While saltwater encroachment has long been the source of groundwater contamination, the discovery of trace quantities of several toxic organic chemicals in well water has raised serious concerns.

Prior to the discovery of agrochemical contamination, it was thought that pesticide use posed no threat to human life. Because chemicals are highly volatile, their residues were expected to evaporate as they percolated down through the rock and soil before intercepting the groundwater source. However, since pineapple fields accelerate recharge faster than natural surfaces, the leaching process is catalyzed. Contaminated runoff percolates rapidly into groundwater stores, leaving less opportunity for evaporation and filtration. Not surprisingly, the spatial pattern of contamination shows the highest concentrations of pesticides in the wettest pineapple fields where percolation is highest.

Urban Honolulu streams contain high levels of the pesticides chlordane, dieldrin, and DDT³⁹. Fumigants and insecticides such as DDT, aldrin, chlordane, heptachlor, and others used in termite control and agribusiness are present in Hawaii's water. Studies by the USGS have detected these "organochloride" pesticides in stream sediment and fish tissue from selected streams on Oahu. Concentrations declined following bans on their use in the early 1970's and then appeared to level off in the 1980's. Even though they are no longer used, concentrations of these poisons continue to persist in Oahu aquatic ecosystems. The sources of these are agriculture and urban soils that erode and enter watersheds. Although little can be done to correct the concentrations of these compounds in soil, controlling soil erosion (especially during land

clearing and construction activities) could reduce levels of pollutants entering streams, and ultimately estuaries and coastal marine ecosystems.

| Name | Use | Where found | Health effects |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Carbon Tetrachloride* | Industrial solvent | Del Monte Navy well (Kunia); Wahiawa; Haleiwa; Wheeler; Camp Stover; Waikele (Navy well) | Probable carcinogen (respiratory cancer, liver tumors, leukemia) |
| DBCP (1,2-Dibromo-3- chloropropane | Soil fumigant (nematicide) | Hawai'i Country Club; Waialua; Haleiwa; Wahiawa; Kunia; Mililani | Probable carcinogen; may cause infertility and sterility in exposed workers; probable mutagen |
| DCP (1,2-Dichloropropane) | Solvent; pesticide in Shell- DD fumigant; contaminant in Telone II fumigant | Mililani | Decreased red blood cells; liver, kidney damage |
| Dieldrin | Insecticide (termiticide) | 'Aica to 'Ainakoa | Probable carcinogen; may damage liver, central nervous system; gastro- intestinal system, kidneys, adrenal gland |
| EDB (Ethylene dibromide; Soil fumigant (nematicide); grain fumigant | | Waipahu; Kunia | Probable carcinogen; may cause infertility and damage to liver, gastro-intestinal system and adrenal glands |
| PCE* (Tetrachloroethylene, also known as "perc") | Industrial solvent; dry-cleaning solvent | Del Monte Navy well (Kunia); Wahiawa; Schofield Barracks | Probable carcinogen; (leukemia); damag to nervous system; possible reproductive effects; liver, kidney damage |
| TCE* (Trichloroethylene) | Industrial solvent; inert ingredient in pesticide formulations | Del Monte Navy well (Kunia); Kunia; Hawai'i Country Club; Kipapa Gulch; Moanalua; Waialua Waipi'o Heights; Waipahu; Schofield Barracks; Mililani | Probable carcinogen; (including leukemia): damage to liver, heart, kidneys, central nervous system |
| TCP (1, 2, 3- Trichloropropane) | Degreasing agent; inert ingredient in some pesticide formulations | Hawai'i Country Club; Waialua; Waipahu; Kipapa Gulch; Haleiwa; Wahiawa; Waipi'o Heights; Ho'ae'ae; Kunia; Mililani | Probable carcinogen; damage to central nervous system, liver, kidneys |

Environment Hawai'i – 1996

In central O'ahu, contamination by dibromochloropropane (DBCP), ethylene dibromide (EDB), and trichloropropane (TCP) forced the temporary closing of several drinking-water wells because of their suspected health risks. The public health hazards posed by agricultural contaminants are very real, and potentially lethal. EDB and DBCP are now banned from use in the islands. Other chemicals of concern are nitrates, trihalomethanes, atrazine, and the industrial chemicals TCE, EDB, and carbon tetrachloride. Groundwater contamination maps showing chemical compounds found in Hawai'i's drinking water are posted annually on the Department of Health website. 40 These maps show locations of wells that are keyed into tables of contaminates and their concentrations as measured in DOH water samples.

Although contamination events in the 1970s and 1980s frightened residents with regard to the safety of their drinking water, they served as a warning for regulators and residents. Contamination of water supplies reaffirmed the basic importance of water for life, and the concept of cause and effect within the hydrologic cycle. Thanks to these experiences, a more effective statewide system of monitoring developed. Although we must now pay for our past mistakes, we are also learning how to avoid repeating them, and how to mitigate future fumbles.

The Water We Drink: Wai Manalo

Frightening though some accounts may sound, the drinking water in Hawai'i remains some of the best in the world. The water we drink principally comes from groundwater, including the flow from artesian wells and springs, or from surface waters. The source of water plays a major role in determining our water quality. The headwaters of our streams generally have pristine chemical quality, but as streams travel through dense agricultural fields, residential developments and urbanized centers, the flow entrains dissolved solids, nutrients, bacteria, sewage effluent, industrial wastes and urban byproducts. Because of its innate purity, groundwater is often preferred for municipal use. However, despite nature's capacity for filtering out unwanted substances, contaminants are finding their way into some subterranean aquifers.

Table 5.22-- FRESH WATER USE, BY TYPE, BY COUNTY: 2000

| [Million ga | llons | per | day | /] |
|-------------|-------|-----|-----|----|
|-------------|-------|-----|-----|----|

| Use | State total | Hawaii | Honolulu | Kalawao | Kauai | Maui |
|---------------------------------------------------------------------|------------------------------------------|--------------------------------------|-----------------------------------------|-------------------|--------------------------------------|----------------------------------------|
| Total | 628.43 | 53.41 | 216.91 | 0.09 | 45.20 | 312.82 |
| Ground water Public supply 1/ Industrial Thermoelectric Irrigation | 428.00 242.83 14.50 - 170.67 | 44.55 31.16 0.04 - 13.35 | 208.84 164.81 12.93 - 31.10 | 0.09 0.09 - | 25.83 14.94 0.27 - 10.62 | 148.69 31.83 1.26 - 115.60 |
| Surface water Public supply 1/ Industrial Thermoelectric Irrigation | 200.43 7.60 - - 192.83 | 8.86 2.50 - - 6.36 | 8.07 - - - 8.07 | - - - - | 19.37 - - - 19.37 | 164.13 5.10 - - 159.03 |

^{1/} Includes water withdrawn by public and private water systems for use by cities and military bases. Water withdrawn by these facilities may be delivered to users for domestic, commercial, industrial, and thermoelectric purposes, or may be used for water and wastewater treatment, pools, parks and city buildings. Source: U.S. Geological Survey, Water Resources, records.

Contamination, defined as any substance hazardous to health when present in sufficient quantities, is rare at the headwaters of streams or in the groundwater below natural forests. However, Hawai'i's highly permeable geology, though responsible for the abundance of water, actually increases the mobility of contaminants, allowing them to flow quickly into the aquifer. As water travels over the land or through the ground, it dissolves naturally occurring minerals and can collect substances resulting from the presence of animals or human activity.

According to both state and national law, citizens of Hawai'i have a right to clean drinking water. 41 Federal laws have become increasingly stringent; potable drinking water systems are prohibited from tolerating any contaminants that could compromise public health, and must not contain pathogenic organisms, toxic material, or any other substances that may be deemed harmful. The national Safe Drinking Water Act of 1975 requires the EPA to establish clear drinking water standards for public water supplies, and monitoring of municipal and privately owned water systems. 42 Enforceable drinking standards, called Maximum Contamination Levels, are required for every region.

The State Legislature, in recognition of the need to support drinking water quality by protecting groundwater quality, authorized the Hawai'i Groundwater Protection Program⁴³ to monitor public drinking water wells. The EPA and the Hawai'i State Department of Health also require the Department of Water Supply to regularly test the drinking water. Several localized contamination sites have been identified, though widespread contamination has never been detected. Not surprisingly, the regulatory agencies disagree about the significance of these preliminary findings. Though the state is confident that monitoring is sufficient to detect potential threats, federal agencies are concerned that these initial findings will instill a sense of complacency. They recognize that although serious agricultural and industrial contaminants were not identified in initial surveys, they may still be present given the limited scope of early monitoring efforts.

In 1999, each household in the state began receiving Water Quality Reports in the mail.⁴⁴ The reports of drinking water contamination are based on current Department of Health monitoring data for public drinking water wells; however, each water supply board is responsible for sampling on individual islands. The reports educate citizens about their drinking water source, indicate any detected contaminants or elements in the water, and assure residents that drinking water meets all the safe drinking water standards. The DOH is establishing sampling protocols for drinking water wells including monitoring of micro-organisms, total coliforms, fecal coliforms, E.coli, inorganic and organic chemicals, radionuclides, and turbidity. Each property requires special tests for detection, yet critics of the program worry that not enough attention is being given to *endocrine disrupters*. This class of chemicals is thought to affect cells by interfering with the endocrine system, which controls reproduction, growth and development in humans and many animals.

Only regulated compounds have established maximum contaminant levels. During routine sampling by DOH across the state in 1998, trace amounts of organic chemicals were detected in separate water systems. Trichloroethylene, a common metal cleaning and dry cleaning fluid, was found in Honolulu Board of Water Supply pumps in Waipahu and Haleiwa. The contaminants were at levels far below federal MCLs (Maximum Contaminant Levels) of 5ppb. Isophorone, used in herbicides, paints and adhesives was detected in Punalu'u, but this contaminant remains unregulated to date, so no safe limits have yet been established in Hawai'i. The presence of

ethylbenzene, a major component of gasoline, was confirmed in Volcanoes National Park, but also at levels far below MCL. 45

Swimming with Bacteria

Frightened by a flurry of water quality violations and media scares in the early 1990's, Hawai'i residents became increasingly concerned about the health risks of swimming at Hawai'i's beaches. Monitoring of *Enterococcus*, a fecal bacterium, showed that waters off Kuhio Beach and Keehi lagoon were some of the most polluted in the state. When debris, including syringes, washed onto a few of O'ahu's crowded tourist beaches, at the same time that surfers and swimmers were reporting strange lesions on their bodies, a barrage of accusations started flying. The public demanded answers about the safety of Hawai'i's swimming waters.

Fears surfaced again following the forty-eight million gallon sewage spill in the Ala Wai Canal during the heavy rains in the spring of 2006. The horrifying death of Oliver Johnson after he fell or was pushed into the Ala Wai shortly after the spill galvanized local fears of beach bacteria to the point that Honolulu and Waikiki beaches and surf breaks were eerily empty for over six weeks following the spill. 46 Johnson died of massive organ failure brought on by septic shock caused by Vibrio vulnificus, a bacterium of the cholera family that multiplied in his body and eventually shut down his principle organs. An important aspect of Johnson's situation is that he did not go to a hospital until some time had passed after the first signs of infection, plus he had open wounds and suffered from chronic liver disease – both conditions that greatly elevate the risk from polluted waters.

The V. vulnificus that killed Johnson is from a family of bacteria that is "particularly happy" in seawater say microbiologists. It does not usually attack people but can mutate into an invasive form capable of overwhelming the body's defenses, especially in patients with chronic liver disease. Most of Hawai'i's Vibrio cases are from wound or blood infections and ear infections, the bacteria can cause vomiting, diarrhea and abdominal pain. V. vulnificus infections can be easily cured within the first day or two with antibiotics, but once it invades the bloodstream, there is a 50% chance of survival according to the Centers for Disease Control and Prevention.

In fact, deaths from waterborne bacteria encountered in our oceans and streams are relatively rare. There have been five deaths in Hawai'i from the family of Vibrio bacteria since 2001.⁴⁷ Also in Hawaiian waters are the potentially fatal bacterial infections *leptospirosis*, staphylococcus aureus and group A streptococci. Since 1974, a total of nine deaths in Hawai'i have been attributed to *leptospirosis*, a freshwater bacterium found in Hawai'i streams and splash pools.

Many swimmer infections that lead to severe complications are just a case of bad luck. One infectious disease specialist interviewed in 2006 said, "With all the people who get cuts and abrasions throughout the state of Hawai'i, only a small number come out with serious life-andlimb infections. It's an uncommon event, unless you're unlucky and pick up the wrong bug, the one that produces those chemical toxins" that can rapidly advance through the human body. 48

So how do you protect yourself from waterborne bacteria? Health officials point out that an open wound or a weakened immune system put you at increased risk of contracting harmful bacteria in our waters. Certain conditions, such as warm seawater or freshwater streams and ponds likely to be contaminated with animal urine, boost the chances of exposure. The best thing is to avoid entering Hawai'i's streams and oceans when you have an open wound especially if you have a weakened immune system.

A good cleansing with antibacterial soap and water to remove dirt and damaged tissue from wounds is still the favored treatment. Keeping cuts and scrapes clean and dry remains the best prescription for preventing skin infections that can worsen and invade the bloodstream, causing life-threatening complications. And with the speed at which these infections can spread, physicians urge people to seek medical care at the first sign of fever, nausea and increased swelling, pain and redness. If you have swum or walked through a stream or waterfall and develop any flu symptoms, treat it as *leptospirosis* and immediately go to a doctor. If you have been in the ocean and develop an infection, do the same thing.

Beach Closures

Public reports in 2006 after the Ala Wai spill highlighted the fact that potentially harmful bacteria are present in the same waters where we swim and play – and have been all along. According to the Natural Resources Defense Council, the state has approximately twenty-four miles of shoreline considered safe, accessible, and generally suitable for swimming.⁴⁹ The process of establishing sampling protocols, indicator organisms, and beach closing standards for these swimming locations is complex. Even though Hawai'i's bacterial standard is one of the strictest in the nation, with water samples having to be less than a geometric mean of seven Enterococcus/100ml compared to a nation-wide value of 35/100ml, there is still considerable controversy over implementation of state guidelines.

The State has proposed a two-part system of designating harmful levels of coastal bacteria. Two types of fecal indicator bacteria are used, Enterococcus and Clostridium perfringens. If the Enterococcus standard exceeds the permitted level, and Clostridium exceeds set limits, then the state will close a beach. Yet, the federal government wants the state to close a beach even when just the Enterrococcus levels are exceeded, and will not accept the state's proposal until studies clearly quantify the health risks associated with a particular level of *Closridium*. Getting such numbers will require extensive research in beach areas where there are a number of disease outbreaks, something Hawai'i has not yet experienced.

The standards of the EPA for *Enterroccoccus* were created from data collected in places like New York City and the Great Lakes, where pollution-related disease was frequent enough to conduct a large-scale study. But in Hawai'i Enterroccoccus may be found in uncontaminated soil as it grows naturally in our environment.

The bulk of the shoreline sewage problem is attributable to three sources:

- Sewage spills from heavy rains that generate overflows in wastewater treatment 1) plants,
- 2) Breaks in sewer lines delivering sewage from homes and businesses to treatment plants, and
- 3) Electrical failures at pumping stations and treatment facilities.

Periodically, a beach will close if fuel or oil from a boat threatens a swimming area. Wailua Beach on Kaua'i closed after approximately 16,000 gallons of diesel fuel spilled from a grounded fishing vessel in 1999.⁵⁰ Interestingly, 99% of beach closures in Hawai'i are due to

spills, compared to 47% of postings on a national level. The question then becomes: does Hawai'i truly have more spills than other parts of the country, or are we failing to detect contamination from other sources? The EPA feels that many potential sources of bacterial pollution are not being adequately monitored or addressed in the state.

One of the major causes of beach closures in other parts of the country is polluted runoff, particularly in urban areas. In 1995, an extensive study of Santa Monica Bay verified the link between illnesses in swimmers and polluted runoff.⁵¹ This study found that people who swam within 100 yards of storm drain outlets are 50% more likely to get colds, flu, sore throats, and diarrhea than those who swam farther away. The study concluded that as many as one-in-ten of those individuals swimming near storm drains will experience symptoms similar to pathogenic exposure. Though this sort of exposure is not usually life threatening, the wellbeing of affected individuals can be compromised, and any viruses present in the water can be a serious health threat to children and the elderly.

Unfortunately, considerable amounts of misinformation about water quality continue to create anxiety about swimming in the ocean. One prevalent misconception is that all infections are from human-contaminated sources. Although swimmers are capable of transmitting infections to one another, such as Stapylococcus aureua, marine organisms can also carry communicable viruses and bacteria. The most common water-borne public health risk in Hawai'i is related to *leptospirosis*, contracted from the urine of mongoose and rats in freshwater. The DOH recommends that school-aged children in particular should avoid all streams, in order to reduce the health risks of *leptospirosis*.

In Hawai'i, only one beach, Lydgate Park on Kaua'i, closed in the late 1990s because of water monitoring data.⁵² Some people argue that this proves Hawai'i's excellent water quality, while others disagree, saying that if only one beach was closed due to monitoring data, then the water-monitoring program must be inadequate. Certainly in Hawai'i far more beaches aren't being monitored than those that are.

Surfrider provides a \$6 do-it-yourself water quality testing kit, approved by the EPA, to check for levels of coliform bacteria. Since the state is most likely to detect problems from known sewage spills, the threat of polluted runoff may well go overlooked under the present monitoring system. As Surfrider's program demonstrates, one way to protect the public from polluted water is to develop active citizen monitoring, where people claim responsibility for the waters they share.

Limited financial resources certainly play a role in the State's monitoring program, but a cost-benefit analysis shows that increased water monitoring would be a sound financial decision for Hawai'i. It would be sound planning for the state to protect the tourist industry by ensuring our waters are safe. The State of California recently adopted a "right to know" bill that requires monitoring of all public beaches with more than 50,000 annual visitors, and regular sampling near storm drains.⁵³ Critics of Hawai'i's program suggest that a protocol similar to California's should be applied to Hawai'i if the state is going to guarantee the safety of swimming water, especially against point source pollution.

The good news for those of us who wade, swim, fish, paddle, and surf is that Hawai'i's dirtiest monitored beaches are still clean by EPA standards. Based on counts of bacteria, viruses and protozoan pathogens, one study identified O'ahu's dirtiest waters, such as Kaelepulu Stream in Kailua Beach Park, as very poor, giving it a rating of 35 enterrococcus CFUs (colony forming

units) per 100 milliliters. Though poor by Hawai'i's standards, this is still within EPA safe swimming guidelines.⁵⁴ Addressing the polluted runoff challenge may well be the best place to start to increase the quality of Hawai'i's waters.

Mamala Bay - the Final Word?

In 1990 the Sierra Club Legal Defense Fund and Hawaii's Thousand Friends sued the City and County of Honolulu for violations of the Clean Water Act related to failing to upgrade sewage processing to the national standard of secondary treatment. The outcome of the suit was the creation of a study commission to establish the nature of ocean circulation in Mamala Bay (defined as the embayment between Diamond Head and Barbers Point) and the character of point and nonpoint pollutants and their potential impact on humans and the ecosystem.

Among the study's findings in 1995 was that sewage plumes from City outfalls were greatly diluted within the zone of the diffusers at the head of outfall pipes⁵⁵. Point sources of pollution had comparatively minor effects on phytoplankton and benthic communities and there was conclusive evidence that nutrient enrichment in shoreline areas was closely related to non-point sources such as cesspool and groundwater drainage or to localized discharges such as from Fort Kamehameha outfall and the Ala Wai Canal. The study found that discharges from Sand Island were able to reach most beaches in the bay (though only rarely), whereas those from Honouliuli were only able to reach only western beaches. The frequency of point source pollution on beaches was low and the risks of contracting an infectious disease by bathing, swimming, surfing or fishing in Mamala Bay waters was low. The Ala Wai Canal was determined to be a major source of contamination of Waikiki Beach, and non-point sources were the primary cause of contamination of beaches in the eastern portion of the bay. Since the report was issued more than a decade ago, Sand Island Wastewater Treatment facility, in keeping with the recommendations of the study commission, has moved to advanced primary treatment with the implementation of ultraviolet disinfection and increased removal of suspended solids.

Who is Watching Our Water?

Monitoring can be the most direct and defensible tool available for evaluating how water quality improves or does not, as a result of regulations and management actions. Hawai'i's Department of Health is the principal water-quality monitoring agency, and is tasked with the challenge of implementing a successful program. Monitoring is expensive and, in itself, not necessarily justifiable unless the results or information can be used for specific purposes. The state's current monitoring plan incorporates four water quality categories: core network, recreational bathing waters, watershed protection, and toxic contaminant screening. Federal agencies such as National Oceanic and Atmospheric Administration (NOAA) and EPA give general guidelines for the state, but continental watershed models cannot necessarily be applied to Hawai'i's dramatically different environment.

The state of Hawai'i and the City of Honolulu have suffered thousands of violations under federal regulations and has been criticized over and over again for its water quality management. The greatest impediments to water resource management may be the governmental and regulatory environment in which it operates. Ironically, overlapping jurisdictions may actually impede cooperation between agencies causing responsibilities to be shifted, ignored, and even

resented. Compounding the problem is the recognition that agency programs may not be structured to solve complex watershed management problems. In the end one must ask, is there a demonstrable health problem?

The feasibility of establishing a comprehensive and successful water monitoring and cleanup program is limited by the reality that watersheds, groundwater, and coastal waters are segmented under a multitude of private owners, and county, state, and federal programs. For watershed management to be successful, all stakeholders must establish an overarching culture of positive support, common purpose, and mutual respect. This will require defining community goals, developing shared tools, and agreeing on common measures of success. How well we protect the remaining natural essence of our state's water supply and the cleanliness of natural coastal waters will foreshadow our success worldwide in preserving the ultimate island: Earth.

¹ Water Resources Research Center, University of Hawai'i at Mānoa, http://www.wrrc.hawaii.edu/bulletins/2001 05/WQWorkshop.html.

Johnny Brannon, Sewage Plant Waiver Denied, Honolulu Advertiser, A1 (Dec. 11, 2007).

³ The City's largest sewage treatment plant on Sand Island has a bioconversion facility that turns sewage sludge into fertilizer pellets. See Johnny Brannon, High-tech Sewage Units Ready to Run, Honolulu Advertiser, B3 (Oct. 30, 2007).

⁴ The Sand Island treatment plant has a disinfection unit that blasts treated wastewater with ultraviolet light to kill pathogens before it is discharged off-shore. See High-tech Sewage, supra note 3.

Frank Spellman, <u>Handbook of Water and Wastewater Treatment Plant Operations</u>, p 609 (CRC Press 2003).

⁶ Federal Water Pollution Control Act Amendments, PL 92-500, October 18, 1972, 86 Stat. 816.

⁷ CWA §43 (g).

⁸ Johnny Brannon, City to Fight EPA's Sand Island Ruling, Honolulu Advertiser, A1 (Dec. 11, 2007).

⁹ Fight, supra note 8.

¹⁰ Fight, supra note 8.

¹¹ Fight, supra note 8.

¹² For more information about the program, see http://www.epa.gov/OWM/cwfinance/construction.htm.

¹³ High-tech Sewage, supra note 3.

¹⁴ Honke et al., White Paper Recommending Approval of the City and County of Honolulu's Honouliuli Wastewater Treatment Plant Application for a Modified NPDES Permit Under Section 301(h) of the Clean Water Act, Hawaii Water Environment Association, p 2 (2007).

¹⁵ Fight, supra note 8.

¹⁶ City and County of Honolulu, Department of Environmental Services,

http://www.co.honolulu.hi.us/env/wwplants.htm

¹⁷ James Moncur et al., Community Structure Of Fish And Macrobenthos At Selected Sites Wai`anae, Oahu, Hawaii, In Relation To The Wai'anae Deep Ocean Sewage Outfall, 1990-1998, Water Resources Research Center, University of Hawaii (2002).

¹⁸ John R. Clark, Coastal Zone Management Handbook, p 404 (CRC Press 1996).

¹⁹ Hunt, C.D., 2007, Groundwater nutrient flux to coastal waters and numerical simulation of wastewater injection at

<u>Kihei, Maui, Hawaii</u>: U.S. Geological Survey Scientific Investigations Report 2006-5283, 69p.

20 J.R. Pegg, <u>Crumbling U.S. Sewage System Undermines Public Health</u>, Environment News Service (Feb. 20, 2004).

Nark Dorfman, Swimming in Sewage, Natural Resources Defense Council (2004).

²² Crumbling Sewage, supra note 20.

²³ Diana Leone, 48 Million Gallons Spill in 6-Day Sewer Break, Star Bulletin (Mar. 31, 2006).

²⁴ Peter Boylan, Judge Finds Honolulu Liable for 297 Violations in Sewage Spills, Honolulu Advertiser (Aug. 20,

²⁵ LAS Biodegradation and Removal in Sewage Treatment, The Council for LAB/LAS Environmental Research, http://www.cler.com/facts/sewage.html.

²⁶ K.L. Knee et al., Estimating the Importance of Submarine Groundwater Discharge in Hanalei Bay, Kauai, Ocean Sciences (2005).

http://hawaii.gov/health/environmental/water/sdwb/conmaps/conmaps.html.

⁴¹ For state law, see Hawaii Water Pollution Law, Haw. Rev. Stat. §342D and Hawaii Constitution, art. VII, §9.

http://www.epa.gov/OGWDW/sdwa/laws statutes.html.

⁴³ See the Hawaii Department of <u>Health Groundwater Protection Program</u> website for more information: http://hawaii.gov/health/environmental/water/sdwb/conmaps/conmaps.html

http://www.hbws.org/cssweb/display.cfm?sid=1081.

²⁷ Personal communication, S. Dollar, University of Hawaii, 10/15/28.

²⁸ Hawaii Department of Health, Clean Water Branch administers the Polluted Runoff Control Program. See http://hawaii.gov/health/environmental/water/cleanwater/prc/index.html

²⁹ Katina Henderson and June Harrigan, Final 2002 List of Impaired Waters in Hawaii Prepared Under the Clean Water Act §303(d), Hawaii State Department of Health (2002).

30 Linda Koch et al., Final 2004 List of Impaired Waters in Hawaii Prepared Under the Clean Water Act §303(d),

Hawaii State Department of Health (2004).

³¹ Watershed Planning Guidance will be completed by the end of 2009 and will be available at the DOH website http://hawaii.gov/health/environmental/water/cleanwater/prc/index.html

³² See Polluted Runoff Program website, supra note 28.

Hawaii's Implementation Plan for Polluted Runoff Control, Office of Planning Coastal Zone Management and Polluted Runoff Control Program (July 2002).

³⁴ Section 6217 of the federal Coastal Zone Management Act Reauthorization Amendments of 1990.

³⁵ Clean Water Act Reauthorization bill of 2004.

³⁶ For more information, see http://hawaii.gov/health/environmental/water/cleanwater/about/aboutcwb.html.

³⁷ Audrey Shileikis, Hawaii Non-Point Source Program: Review of the Implementation Plan, EPA (Sep. 2000).

³⁸ Review, supra note 37.

³⁹ A.M. Brasher and S.S. Anthony, 2000, Occurrence of Organochlorine Pesticides in Stream Bed Sediment and Fish From Selected Streams on the Island of Oahu, Hawaii, 1998 from selected streams on the island of Oahu, Hawaii, 1998. Fact sheet 140-00; http://pubs.er.usgs.gov/usgspubs/fs/fs14000

⁴⁰ The contamination maps are posted here

⁴² For more information on the Safe Drinking Water Act, see

⁴⁴ For the water quality reports of the City and County of Honolulu, see

⁴⁵ Reports, supra note 44.

⁴⁶ Beverly Creamer and Loren Moreno, 'Horrible, Horrible Death' by Infection, Honolulu Advertiser (Apr. 8, 2006).

⁴⁷ Christie Wilson, How Safe is the Water?, Honolulu Advertiser (May 7, 2006).

⁴⁸ How Safe, supra note 47.

⁴⁹ NRDC, <u>Testing the Waters 2008: Hawaii</u> (2008).

⁵⁰ Pollution, Disaster Prevention and Management, Vol. 9, Iss. 3 (2000).

⁵¹ Cited by Kenneth Schiff et al., Seas at the Millennium: An Environmental Evaluation: Southern California, Marine Pollution Bulletin, Vol. 41, Iss. 1-6, pp 76-93 (2000).

⁵² NRDC, <u>Testing the Waters 2007: Hawaii</u> (2007).

⁵³ Surfrider Foundation, State of the Beach Report: Surf Zone Water Quality, <u>California</u>,

http://www.surfrider.org/stateofthebeach/08-fc/body.asp?sub=SurfZoneWaterQuality

⁵⁴ Fight, supra note 8.

⁵⁵ R.R. Colwell, G.T. Orlob, J.R. Schubel, 1995, Mamala Bay Study, Water Quality Management in Mamala Bay, Executive Summary, December.

From: Jason Kagimoto < ikagimoto@kauai.gov >

Subject: RE: Are other approved developments likely to require service by the

Wailua WWTP?

Date: 4 February 2021 at 3:28:16 pm GMT-10

To: Anne Thurston athurston@irmt.org>

Anne,

Providing responses to your email below in red.

Jason Kagimoto, P.E.
Wastewater Management Division
County of Kaua'i, Department of Public Works
4444 Rice Street, Suite 275
Līhu'e, Kaua'i, Hawai'i 96766
(808) 241-4083
jkagimoto@kauai.gov

From: Anne Thurston athurston@irmt.org
Sent: Thursday, January 28, 2021 2:42 PM
To: Jason Kagimoto skagimoto@kauai.gov

Subject: Are other approved developments likely to require service by the Wailua WWTP?

CAUTION: This email originated from outside the County of Kauai. Do not click links or open attachments even if the sender is known to you unless it is something you were expecting.

Dear Jason,

Thank you, again, for your email of 26 January. You kindly said that I might send further questions if I have them.

The list below identifies approved developments on the East side, identified by the Kauai Planning Department when their final list was submitted for the County 2018 General Plan update. In addition to the two developments that you have already mentioned, are any of the other developments listed below likely to require service by the Wailua WWTP?

- a) Pi'ilani Mai Ke Kai (181 single family lots) Based on the current state of the project, the Wastewater Management Division has not provided a determination for the ability to serve this project.
- b) Kulana Subdivision (172 single family homes) Based on the current state of the project, the Wastewater Management Division has not provided a determination for the ability to serve this project.
- c) Coconut Plantation (192 resort units) I assume this is the Sheraton Kauai Resort at Coconut Beach? If so, this project is already built and being serviced. I am unaware of further development of this site.
- d) Coconut Beach Resort (330 condo units) We recently discussed this project. However, they have rescinded their building permit application as this project will not be moving forward. As a result, we will not be reserving capacity for this project.
- e) Coco Palms (350 resort units) We recently discussed this project. The Wastewater Management Division is reserving capacity for this project.

EXHIBIT "I-100"

f) Kealia Mauka (234 single family homes) Based on the current state of the project, the Wastewater Management Division has not provided a determination for the ability to serve this project.

I shall be very grateful for your help with this.

Best regards, Anne Thurston

From: Jason Kagimoto < ikagimoto @kauai.gov >

Subject: FW: second FOIA request

Date: 22 January 2021 at 8:01:46 am GMT-10 **To:** "athurston@irmt.org" <athurston@irmt.org>

Anne,

In response to your inquiry, I am not sure what contractor mentioned that we do not have capacity at our Wailua WWTP but this is not correct. The Wailua WWTP has available capacity but the question of capacity is a two part question. One is the WWTP and one is the sewer collection system. Our ability to accept future customers' needs to be evaluated on a case by case basis to determine whether the existing sewer collection system has enough capacity to convey it to the Wailua WWTP since it depends where future connections are made within the sewer collection system.

Feel free to let me know if you have any questions.

Mahalo.

Jason Kagimoto, P.E.
Wastewater Management Division
County of Kaua'i, Department of Public Works
4444 Rice Street, Suite 275
Līhu'e, Kaua'i, Hawai'i 96766
(808) 241-4083
jkagimoto@kauai.gov

From: Alison Togioka atogioka@kauai.gov">atogioka@kauai.gov Sent: Thursday, January 14, 2021 4:17 PM
To: Jason Kagimoto jkagimoto@kauai.gov

Cc: Troy Tanigawa <ttanigawa@kauai.gov>; Michael Tresler <mtresler@kauai.gov>; Shirley Estenzo

<sestenzo@kauai.gov>; Donn Kakuda <dkakuda@kauai.gov>

Subject: RE: second FOIA request

hi Jason, here is the attachment. Alison

From: Jason Kagimoto < <u>jkagimoto@kauai.gov</u>>
Sent: Thursday, January 14, 2021 4:13 PM
To: Alison Togioka <a togioka@kauai.gov>

Cc: Troy Tanigawa <ttanigawa@kauai.gov>; Michael Tresler <mtresler@kauai.gov>; Shirley Estenzo

<sestenzo@kauai.gov>; Donn Kakuda <dkakuda@kauai.gov>

Subject: RE: second FOIA request

Alison,

Was there an attachment?

Jason Kagimoto, P.E.
Wastewater Management Division
County of Kaua'i, Department of Public Works
4444 Rice Street, Suite 275
Līhu'e, Kaua'i, Hawai'i 96766
(808) 241-4083
jkagimoto@kauai.gov

From: Alison Togioka atogioka@kauai.gov>
Sent: Thursday, January 14, 2021 8:39 AM

To: Jason Kagimoto < <u>jkagimoto@kauai.gov</u>>; Donn Kakuda < <u>dkakuda@kauai.gov</u>>

Cc: Troy Tanigawa < ttanigawa@kauai.gov">; Michael Tresler < mtresler@kauai.gov>; Shirley Estenzo

<sestenzo@kauai.gov>

Subject: FW: second FOIA request

fyi

From: Public Works - voicemail account Sent: Thursday, January 14, 2021 8:38 AM To: Anne Thurston athurston@irmt.org

Subject: RE: second FOIA request

Aloha Anne,

We are in receipt of your Request to Access a Government Record dated January 12, 2021. Please be advised that your request has been forwarded to our Wastewater Division.

As you may be aware, the Governor's Twelfth Proclamation and Thirteenth Proclamation related to the COVID-19 Emergency suspended Hawai'i Revised Statutes Chapter 92F and Chapters 71, 72, Title 2 of the Hawai'i Administrative Rules, to the extent they contain any deadlines for agencies relating to requests for government records. Pursuant to the Governor's Emergency Proclamations and because this request requires search and review for permissibility of production, a response may not be provided in the ordinary course.

Mahalo,

Alison Togioka
Department of Public Works
4444 Rice Street, Suite 275
Lihue HI 96766

Phone: (808)241-4996 Email: atogioka@kauai.gov

From: Anne Thurston athurston@irmt.org Sent: Wednesday, January 13, 2021 5:47 PM

To: Public Works - voicemail account < publicworks@kauai.gov>

Subject: second FOIA request

CAUTION: This email originated from outside the County of Kauai. Do not click links or open attachments even if the sender is known to you unless it is something you were expecting.

KAPAA QUADRANGLE HAWAII-KAUAI CO. 7.5-MINUTE SERIES (TOPOGRAPHI U.S. DEPARTMENT OF THE INTERIOR U.S. GEOLOGICAL SURVEY Produced by the United States Geological Survey in cooperation with National Imagery and Mapping A RECEIVED 88 I I S AAM MAR 3 1 1999 BECEINED USGS NMD HISTORICAL MAP ARCHIVES KAPAA, HI 1996

EXHIBIT "I-101"

KAPAA QUADRANGLE HAWAII-ISLAND AND COUNTY OF KAUAI 7.5 MINUTE SERIES (TOPOGRAPHIC) 159-17 UNITED STATES DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY

EXHIBIT "I-102"

Witness Statement of Bridget Hammerquist, JD, BSN

February 10, 2021

Q. Please state your name and place of residence.

A. My name is Bridget Hammerquist. I am a resident of Kaua`i and live at 2963 Pua Alani Place, Koloa, Hawaiʿi 96756.

Q. Please discuss your skills, experience, and training background in areas relevant to your opinions on the proposed redistricting of 96 acres of agricultural land for the HoKua Place project?

A. I retired after a 26 year legal practice in 2008. I remained a licensed member of the bar until 2017. I was primarily a litigator but I served as a Judge Pro Tem in the latter part of my career. In 2014, I became active in the community regarding issues concerning a project that threatened serious contamination of our drinking and ocean water. Since that time I have been actively involved in an effort to preserve the quality and quantity of Kaua`i's fresh water. My testimony concerns the lack of available County water system services for the proposed HoKua Place.

As part of my work, I have researched and studied parts of the County water delivery system and I have become knowledgeable about the infrastructure limitations and capacity issues associated with transmission of water from the Lihue basin to the East Wailua and Kapa'a areas. In particular, a community group, of which I am a member, Kia'i Wai o Wai'ale'ale, filed a comment objecting to the stream water diversions from Wailua tributaries that fill the Kapaia reservoir and are ultimately processed by the Kaua'i County Department of Water (KDOW) Grove Farm Waiahi Surface Water Treatment Plant (SWTP) in East Kaua'i. In processing the water, there is a chronic exceedance of free radical aluminum and aluminum flocculant because the Kapaia is an earthen reservoir with a bauxite substrate. Aluminum exceedances in the wastewater Waiahi SWTP have been significant and chronic. The SWTP lost its NPDES Wastewater Permit on April 30, 2016 and, at present, it has not been renewed. Because of its chronic exceedances and failure to properly dispose of its aluminum sludge, the State imposed a \$459,000 penalty against the Waiahi SWTP in July 2020.

In the course of researching the Waiahi SWTP, we learned that, as the County General Plan Update confirms, the SWTP currently has a maximum capacity limitation of 3 MGD per day. Because of the demand for water to the Wailua-Kapa'a communities, KDOW has made a plan to increase the capacity of the Waiahi SWTP constructed via a joint partnership between KDOW and Grove Farm. Unfortunately, KDOW records confirm that there has never been an environmental evaluation of the stream tributaries diverted to the Kapaia reservoir. In April 2018, a lawsuit was filed against KDOW for its failure to assure the required environmental review pursuant to HRS \$\\$343 and 171-58. The lawsuit also objects to the water's use without proper stream diversion permits from the State Board of Land and Natural Resources (BLNR) and the Commission on Water Resource Management (CWRM). The lawsuit is still pending. According to KDOW records and the County General Plan, these infrastructure issues must be resolved before the County can increase its capacity and transmission of potable water East of Lihue. At present, there are 700 home sites in an approved Department of Hawaiian Home Lands (DHHL) Homestead in Wailua that cannot be built because of a water shortage. The DHHL development is mauka of Kuhio Highway, just East of the Wailua bridge and opposite the Lydgate Wailua Wastewater Treatment Plant. The limitation for wastewater service by the Wailua Wastewater Treatment Plant has also contributed to the inability of the DHHL homes to be built. Exh. I-64 at 117 (Wailua Facility Plan FEA). Based on all of the documents and research I have done in the last seven years, I am particularly aware of the infrastructure limitations on our island. Before this Land Use Commission considers redistricting

EXHIBIT "I-103"

valuable agricultural land to Urban, I implore your consideration of the following excerpts from the County 2018 General Plan Update:

"Waiahi Water Company, a division of Grove Farms along with DOW developed the Kapaia Reservoir as a water source. In 2005 they opened a water purification plant that draws water through Hanamā'ulu Ditch into a treatment system. The capacity is 3.0 MGD and it serves 15,000 customers. DOW purchases some of this water. Potential upgrades to expand capacity by 60% would cost \$8.13 Million, or \$31.7 Million if they double capacity." Exh. I-26 at 507 (2018 General Plan).

"Kaua'i is like many rural areas in that it has a small tax base and limited resources to fund infrastructure improvements." Exh. I-26 at 138.

Two General Plan studies document existing infrastructure conditions and estimate future need - the General Plan Update Kaua'i Infrastructure Analysis (2015) and Assessment of the Adequacy of Kaua'i Infrastructure for Current and Future Needs (2015) ("General Plan studies"). These studies identified projected deficits of water and wastewater capacity in some districts, indicating a need for more capacity to accommodate the 2035 population (see Figure 3-7)." Exh. I-26 at 138-139. Projected wastewater and water system capacity by 2035 is negative for East Kaua'i. *Id.* at 141; *see also* Exh. I-26 at 508 (noting lack of source and storage deficiency for the Wailua-Kapa'a area). Kaua'i's water system transmission lines "need replacement due to age, deterioration, or inadequate size." *Id.*

According to the General Plan studies, a 7.16 MGD deficiency in potable water is anticipated between 2015 and 2035. They reported that for East Kauai, a 3.13 MGD deficiency was anticipated. Exh. I-26 (Figure 3-7 at 141).

The health of our island is the health of our community, and it starts with protecting our watersheds. The public has called the health of our watersheds into question, and the increasing threats of pollution and overuse are apparent. Recognition of our environment as a living system transcending land boundaries and physical walls should always be woven into our actions moving forward. Emphasis should be placed on actions that address the disproportional impacts of growth on our watersheds. Traditional approaches of land use and resource management, including the understanding of water and watershed resources as public trust resources, promote our sense of place and make environmental sense when seeking options that balance our growing community and the need to maintain healthy watersheds.

Exh. I-26 (General Plan at 45). While Kaua'i has been gifted with an abundance of rain water, it has significant limitations in its ability to deliver potable water to the already existing communities:

"Kaua'i is endowed with ample water supply in our aquifers, but water distribution is limited by a system that requires expansion to meet projected demands through 2035." Exh. I-26 at 139.

"The Water Plan 2020, updated in 2001, is revisited yearly by the Department of Water (DOW) to reprioritize improvements and be in sync with current land development needs. However, the coordination between DOW improvements and long range planning can and

must be improved. The lack of coordination has led to inefficiencies and delays as the DOW requires lead time in process permitting and funding. This has had the effect of delaying or even halting construction of new housing and commercial projects." Exh. I-26 at 140.

In December 2020, we asked KDOW for "all correspondence, attachments, reports, staff submittals, or other documents" concerning HG Kaua'i Joint Venture, LLC or Three Stooges LLC's development of water infrastructure, wells, aquifers, drilling, or other water delivery matters for the HoKua Place project (fka Kapa'a Highlands) located at (4) 4-3-003:001. None of the documents KDOW returned constituted an agreement for a waster master plan for HoKua Place. KDOW's Chief Engineer wrote to Kapa'a Highlands representatives to explain that KDOW was not in a position to assure water service to the homes then planned which were significantly less than the 769 units currently proposed, writing: "At the present time, [DOW] cannot commit to storage capacity for Kapa'a Highlands Projects. It is not clear what you are requesting the DOW to do. DOW has two larger water projects of 349 units and 198 units that have conditional Planning approval subject to providing source and storage. If we allow you to go forward without providing storage or offering storage to those projects first and your project to our knowledge does not have zoning puts DOW in a tenuous position." Exh. I-105 at PDF 11 ("Letter from D. Craddick, Manager and Chief Engineer, Kaua'i Department of Water, to Greg Allen, Subject: Water Master Plan (WMP) for the Kapa'a Highlands Project on TMK: 4-3-03:001, Water Meter Service Request or Water Service Inquiry (May 16, 2011)).

By letter dated August 20, 2012, Kapa'a Highlands representatives proposed a revised water agreement. Exh. I-104 at PDF 13. On August 21, 2012, while Kapa'a Highlands was still seeking a water agreement with KDOW, the Kaua'i Board of Water Supply minutes reflect that there was no agreement reached. *Id.* at PDF 8.

KDOW stressed the need to have a new storage tank in place (the KDOW Ornellas tank) indicating that they couldn't agree to provide Kapa'a Highlands with water from the Stables Camp tank because of its existing commitments. Prior to their failed effort to obtain an agreement with KDOW for water service to Kapa'a Highlands, now HoKua Place, the developer attempted drilling a test well with a plan to convert the well to a production well.

Unfortunately, the drilling did not go well and CWRM required the developer to abandon the well and file an abandonment permit. Exh. I-97 (CWRM records for Kapa'a Highlands Well No. 0419-005). CWRM staff wrote:

I spoke with Tom Nance on the phone in September 17, 2008 about the well completion details, as a follow-up to my conversation with Shook Luellen, representing Marcus Frandsen of High Plains Drilling. I asked about the video survey Shook said Tom Nance had done on the well. Tom asserts that he had nothing to do with how the well was constructed and didn't do the video survey. He said that Marcus Frandsen had the survey done; Nance doesn't have the video record. Tom also explained that he was asked to evaluate the well (or wellbore) conditions after the well was constructed. He was asked to do the pumping test and make recommendations for drilling and construction of the other supply wells planned for the project. His report, prepared for Greg Allen and dated October 27, 2006, is the result of his work. He asserts that the term "exploratory boring" was used by Marcus Frandsen, and wasn't a result of his work on the project. Tom gave some advice as to how to complete the well, if the boring was to be converted for use as a water supply well for the project and says that "Marcus didn't listen" to him or do what he advised, but proceeded on his own. Tom told me that his opinion is that the well should be filled with concrete and

Tom told me that his opinion is that the well should be filled with concrete and permanently sealed and then, if a supply well is still needed for the project, a new

well be drilled and properly constructed. Tom's opinion is that the well as currently constructed is not suitable for use as a water supply well and does not comply with the Hawaii Well Construction & Pump Installation Standards.

Exh. I-97 at PDF 130 (Memorandum from Denise Mills, CWRM, to File, Subject: Well No. 0419-05-Well construction issues (Sep. 18, 2008)) (emphasis added). No final well completion permit was issued and no final pump test data was ever submitted to CWRM. At present, the developer is non-compliant. *See* Exh. I-97 at PDF 9 (Email from Charley Ice, CWRM staff, to G. Allen, Subject RE: Kapaa Highlands Well (0419-05) (Jun. 14, 2011)).

The developer has been unsuccessful in securing a water service agreement thus far there is no alternative. The well drilling effort failed. Based on the critical limitation on water for the project, and the other infrastructure problems with wastewater and traffic, please accept this testimony in support of my sincere request that the LUC deny Petitioner's Request for a DBA on behalf of our community, our environment, its health, and the quality of life for all those who live in the area or travel through the Kapa'a highway traffic corridor.

REGULAR MEETING MINUTES BOARD OF WATER SUPPLY

Tuesday, August 21, 2012

The Board of Water Supply, County of Kaua'i, met in regular meeting at the Board Conference Room in Līhu'e on Tuesday, August 21, 2012. Chairperson Daryl Kaneshiro called the meeting to order at 2:25 p.m. On roll call, the following answered present:

BOARD:

Mr. Daryl Kaneshiro, Chairperson

Mr. Randall Nishimura Mr. Michael Dahilig

Mr. Larry Dill

Mr. Clyde Nakaya, Vice Chair (entered meeting @ 2:50 p.m.)

ABSENT/EXCUSED:

Mr. Raymond McCormick

Mr. Roy Oyama

Quorum was achieved with 4 members present at the time of roll call.

STAFF:

Mr. David Craddick

Mr. William Eddy Mr. Val Reyna Ms. Joy Buccat Mr. Gregg Fujikawa Ms. Marites Yano Mr. Dustin Moises Mr. Keith Aoki

Mr. Jeff Mendez Ms. Sandi Nadatani-Mendez

Deputy County Attorney Andrea Suzuki

GUESTS:

Mr. Clyde Kodani, Kodani & Associates

Mr. Tom Nance, TNWRE Inc. Mr. Greg Allen, Kapa'a Highlands Ms. Joanne Allen, Kapa'a Highlands

Mr. Michael Tresler, Grove Farm Company Ms. Shawn Shimabukuro, Grove Farm Company Mr. David Hinazumi, Grove Farm Company

ACCEPTANCE OF AGENDA:

Mr. Dahilig moved to accept the agenda as circulated, seconded by Mr. Dill; with no objections, motion was carried with 4 ayes.

EXHIBIT "I-104"

Regular Meeting: Tuesday, August 21, 2012 - Page 1 of 15

At 3:05 p.m. Chair Kaneshiro moved for the Regular Meeting back into session.

Chair Kaneshiro requested to rearrange the agenda to go back to Manager's Report No. 13-1 and recused himself from this agenda item.

Chair Kaneshiro relinquished his chairmanship to Vice Chair, Mr. Nakaya.

Re: Manager's Report No. 13 – 1- (revised) Points of disagreement with the Kapa'a Highlands Proposal

Mr. Nishimura moved to receive *Manager's Report No. 13 – 1- (revised)* Points of disagreement with the Kapa'a Highlands Proposal which was distributed yesterday, seconded by Mr. Dill; by a unanimous vote, motion was carried with 4 ayes.

BACKGROUND:

Manager Craddick and the Board received a revised agreement on behalf of the Kapa'a Highlands Proposal yesterday and did not have sufficient time to read the agreement. Manager Craddick requested to recess the meeting or to consider rescheduling this item to the next Board meeting on September 20, 2012.

Mr. Greg Allen and Mr. Tom Nance with Kapa'a Highlands provided their testimony.

After the last meeting, the Board recommended that Mr. Allen and Mr. Max Graham sit and agree because Manager Craddick said they were pretty much in agreement. Mr. Allen and Mr. Graham stayed after the meeting and took notes and drafted an agreement. Mr. Allen's understanding is that the agreement was given to the water management because there were some changes. He incorporated the changes which are the water agreement that is before the Board.

Mr. Allen summarized the agreement for the Board. The agreement will give the DOW a well that will produce 50% more water that they will ever use in the project for Phase I and Phase II or future residential. DOW will let Kapa'a Highlands buy storage on the stables camp tank by paying a pro-rata share of the cost of the tank construction for Phase I, 5 agricultural lots. DOW will let Kapa'a Highlands buy water storage in the Ornellas tank for Phase II which are an additional 7 acre cultural lots or the residential system. Basically the staff wanted Kapa'a Highlands to pay a pro-rata share of the higher cost of the Ornellas tank. Kapa'a Highlands was trying to get DOW to let Kapa'a Highlands buy the storage and stable tank. Kapa'a Highlands agreed to do it from the Ornellas tank.

Mr. Allen stated going back to July 2011, when they had a very short one page Manager's Report it said to trade for a well. This is what Kapa'a Highlands have been working on since July 2011. It was going to be dollar-for-dollar or gallon-for-gallon and it got complicated and now it is a pro-rata share of cost of construction which he thinks is simple.

DISCUSSION:

Mr. Nishimura wanted clarification on Items #1 through #8 on the Manager's Report 13-1 and if it will be addressed by the changes in the agreement that were submitted yesterday.

Mr. Allen explained Item #1 states if Kapa'a Highlands will do more than the county affordable housing. Mr. Allen said they will be doing the county affordable Ordinance 860 which is up to 30%. It is not more than; but it is meeting the county's ordinance.

Item #2 states DOW has never given an allocation of resources or committed water before a project has zoning. Kapa'a Highlands is requesting an allocation of resources before getting zoning for its project. Mr. Allen stated Kapa'a Highlands has zoning and the Land Use Commission (LUC) application has been accepted by staff and is circulating right now. Mr. Tom Nance can address the Water Master Plan and believes it is adequate for the current application.

Item #3 – states Kapa`a Highlands is asking for a master plan revision to reflect the revised plan. Kapa`a Highlands does not want to provide a revised master plan. The third MOU submitted on or about June 15, 2012 by Mr. Max Graham's office states that they want the Department to agree to provide water meters together with all of their potable, agricultural and fire protection needs to Phase 1, the "residential project" and Phase II if the applicant has bonded the FRC. The FRC should be paid (in full) prior to the DOW building permit approval and the DOW water meter approval. Bonding for FRC should not be allowed as a substitute for all payment for building permit and water meter service. The Rules/Subdivision Ordinance only allow the FRC to be bonded for Final subdivision map approval by the Planning Commission. The Rule further says that the FRC must be paid and necessary (bonded) water system improvements must be completed and accepted prior to water meter approval.

Mr. Allen provided no response to Item #3.

Item #4 states DOW is restricting where storage resources will come so all resources which were installed to meet county affordable housing requirements are not used by a single developer until zoning is approved.

Mr. Allen stated Kapa'a Highlands agrees.

Item #5 in the Summary states the applicant will have the right to pay for storage and to have storage in the Ornellas tank or new department tank allocated to Phase II (Lots 6-12).

Mr. Allen stated Kapa'a Highlands agrees.

DOW wants payment of the storage and in the Summary Kapa'a Highlands will pay DOW at the time of construction. If Kapa'a Highlands does not pay DOW, then they do not have a right to it. *Mr. Allen thinks this is taken care of.* Manager Craddick asked what if the storage is already constructed which is the issue in Item #5. *Mr. Allen stated the only one that is already constructed is the stables and is going to be paid for when they get the permit.*

Item #6 states DOW standards require well site to be conveyed fee simple. Kapa`a Highlands lasts proposal is to convey a site easement and not fee simple.

Mr. Allen said the easement has not been cleaned up completely. The DOW wants to own the land. Kapa'a Highlands wants to give the DOW an easement because they were trying to get Kapa'a Highland's subdivision done without going back and redrafting the subdivision drawings. In the agreement, Kapa'a Highlands will cooperate with subdividing the land later.

Item #7 states DOW rules require construction and conveyance of water system facilities (distribution, transmission, source and storage) prior to issuance of water service. Kapa'a Highland's latest proposal is that water service for Phase I not be dependent on actual construction of water system facilities.

Manager Craddick stated DOW rules require construction prior to issuance of water service. Mr. Allen stated that should be no problem because they are going to pay. Manager Craddick said it is not possible to give meters if the facilities are not constructed whether they agree on pro-rata share or not. He understood from the previous agreement Kapa'a Highlands wanted to get those meters without the facilities being constructed.

Mr. Allen thought the fact was clear that there was plenty of storage in the stables camp tank but DOW wanted Kapa'a Highlands to pay the higher cost of the Ornellas tank. So DOW wants Kapa'a Highlands to pay the higher cost of the Ornellas tank assuming that Kapa'a Highlands would not be building the units until after that was completed. Unless if they were building units before the Ornellas tank was completed, Kapa'a Highlands would have to come to DOW to ask if there was some portion is available off stables.

Manager Craddick stated DOW is charging for one tank where the storage is coming from. Mr. Nance added as it is drafted, the storage for Phase I is max day for 20,000 gallons. This is the only thing that comes out of storage tank. Kapa'a Highlands would have completed the well facilities and given it all to DOW before getting all the services for the first 5 agricultural lots. Storage and everything else is dependent on Ornellas or Kapa'a Highlands building another tank.

Item #8 states DOW has offered to explore the possibility of bonding and cost sharing of the Kapahi 325' tanks that are currently in design to satisfy the storage requirements for the current 13 lot subdivision that has tentative subdivision approval.

Mr. Allen stated this is in the current agreement.

Mr. Allen said the deadline with the Planning Commission is the end of August for approval for the agricultural subdivision. It if is not approved in August, it will be rescinded by the Planning Commission.

Mr. Nishimura questioned why is Phase II part of the agricultural subdivision. Mr. Allen stated the agricultural subdivision is two phases; 5 agricultural lots and 7 agricultural lots. The 7 agricultural lots equal or are the same area that the County of Kaua'i General Plan (GP) designates for residential. When Kapa'a Highlands inherited the subdivision project, they went

to the county and it was evident the county did not want agricultural but wanted urban or residential lots. The county entitled it urban. This is what they are doing through the LUC and they are doing very well. If it were not to happen, the tentative approval they have now is for agricultural.

Mr. Tom Nance explained the supply number of Phase I of the agricultural max day number is only 20,000 gallons which is really small. The max day number for Phase II is 60,000 gallons if it remains agricultural. This is a very small amount versus a well that is going to produce 60,000 gallons. The max day number is 20,000 gallons plus 60,000 gallons which is a total of 80,000 gallons max day amount for Phase I & II (in round numbers). These are average day numbers (multiplied by 1.5 a ballpark figure).

Mr. Allen stated from a layman's perspective, it looks like we are going to provide a good source of water. Mr. Allen stated they need storage to build housing in Kapa'a. This is something that has been in the GP since the 1970's. Kapa'a Highlands have been trying to fulfill the desire of the GP to do what is generally perceived the right thing in the area. In order to do this, they need storage for water. Mr. Allen heard prices on the Ornellas tank on what it is going to cost, is more that they can build a private water system for. We are trying to play the game and be part of the county, to have people on county water and be part of the Kapa'a community. Mr. Allen agrees the Board needs time to read the revised agreement because the agreement has gone back and forth. Mr. Graham and the Water staff met and there are more changes to the agreement.

Mr. Allen stated that the subdivision agreement will be lost which was from the result of Mr. Texeira at the last Planning Commission meeting. The agreement does not have any more extensions until August and maybe the Planning Commission may change their mind. Mr. Allen stated the Board can speak to that.

At 3:23 p.m. Vice Chair, Nakaya has called the Regular Meeting into a recess.

At 3:25 p.m. Chair Kaneshiro reconvened the Regular Meeting back to session and to rearrange the agenda to move Manager's Report No. 13-1 to the end of the agenda and continue on Manager's Report No. 13-5 - 2012 Goals for the Manager / Employee Morale

Manager's Report No. 13-5 - 2012 Goals for the Manager / Employee Morale BACKGROUND:

Manager Craddick indicated the Manager's Position Description was not updated since 1962. There are 17 tasks in the Board binders which Manager Craddick would like the Board to rank in order of importance (10 being highest importance). Some of the goals for the Manager will be rewritten in the Position Description.

DISCUSSION:

Mr. Nishimura's primary purpose of putting the Manager's Report No. 13-5 on the agenda is to review the goals established for the Manager and to compare his progress relative to the goals that were set for him. The Board should look at how the Manager stands on the goals from the last fiscal year 2011 - 2012. Manager Craddick has put together his goals for the future which is

Mr. Nishimura moved to have Manager Craddick refine the *Manager's Report No. 13-5* - 2012 Goals for the Manager / Employee Morale for the next Board meeting, seconded by Mr. Dill; with no objections, motion was carried with 5 ayes.

At 3:50 pm, Chair Kaneshiro called for the Regular Meeting into a recess while he relinquished his chairmanship to Vice Chair, Mr. Nakaya and he recused himself from resuming Manager's Report No. 13-1(revised) Points of disagreement with the Kapa`a Highlands Proposal.

At 3:55 p.m., Vice Chair, Mr. Nakaya reconvened the Regular Meeting back into session.

Re: Manager's Report No. 13 – 1- (revised) Points of disagreement with the Kapa'a Highlands Proposal

Mr. Nishimura moved to receive the letter granting an extension until August 31, 2012 to the applicants along with the *revised* subdivision report dated October 9, 2007 and stamped October 10, 2007 into the record; seconded by Mr. Dahilig; by a unanimous vote, motion was carried with 4 ayes.

Mr. Dahilig stated this would be the applicant's 10th request for extension with the Planning Commission but nothing has been officially been written. There is a possibility for the extension to be extended but he cannot know how the Planning Commission would react. Mr. Dahilig has not formulated his recommendation to the Planning Commission members regarding the applicant.

Mr. Dahilig would like to understand if the word "shall" should be there instead of "may" in Paragraph 2. This project has not been received for approval from the LUC. The Planning Commission has not received concurrence from the LUC regarding this proposal. If the agreement is reached between Manager Craddick and Kapa'a Highlands, Manager Craddick would recommend to the Board and give extraordinary attention and approval by the Board beyond the Board's normal practice. Is this approval worth what is usually never done.

Manager Craddick said the Board had a list of affordable housing projects that they wanted to push development for the tank. The county is not going to move forward on those affordable housing projects. Manager Craddick stated the Kapa'a is deficit in source and the applicant is offering source which is a high risk in DOW's business. The extra source is why the Board is in this discussion. The source may be enough for the applicant's own development. The project may go bad with the applicant, they get nothing and DOW has given nothing. If the project is good, then DOW benefits. The timing may run out for the application to proceed with their project. Mr. Dill asked if this project moves forward, would this be a concern for the department. Manager Craddick stated if someone offered DOW to develop source with no risk to DOW, this would be on a case-by-case bases.

Mr. Dahilig noted from Planning Commission's initial comments in the 2007 report for a subdivision approval, it made no mention on the current improvements that the Board is discussing today. His impression has transpired during the five-year period as a big attempt to add items. Which was first an agricultural subdivision approval of water is now the 25 steps

reclassification of this property into urban and a subsequent track to development. If DOW says that we do not need to do the source development, would the applicant unwind everything to say DOW is still satisfied on what was required based on the original subdivision agreement.

Manager Craddick said the applicant did not want to give the well knowing that it could produce more and not being able to use it. There would be other ways of doing the agreement.

Mr. Dahilig said there is an LUC issue and a final subdivision approval for the applicant to get their extension. He is not certain what the applicant has before the Board. It depends upon whether they can meet the threshold of an extension of final approval at the Subdivision Committee and Planning Commission next week Tuesday. The LUC issue is not a project that is being entertained. But for the DOW to say having the LUC matter folded into would end up being the final subdivision approval that gets filed with the Bureau of Conveyances, this would be an advantage for DOW to delay a decision. If this is not incumbent the applicant can get through the Planning Commissions stages, then DOW can delayed a decision. Manager Craddick says there is a high risk value to continue the process of negotiation. The Planning Commission issue needs to be unlocked and if the Board can get a clear decision from Manager Craddick whether to move forward on this project or not.

Deputy County Attorney, Andrea Suzuki will render legal advice as it pertains to the agreement's time frame on this matter and to check with the County Attorney. Mr. Dahilig moved to go to executive session, seconded by Mr. Dill.

Vice Chair, Mr. Nakaya requested for a roll call vote.

Board Member, Mr. Nishimura Board Member, Mr. Dahilig Board Member, Mr. Dill Vice Chair, Mr. Nakaya

At this time, 4 Board members answered Aye to the roll call vote.

At 4:15 p.m. Vice Chair, Nakaya recessed the Regular meeting, while the Board convened into an executive session.

Pursuant to Hawaii Revised Statutes Sections 92-4 and 92-5(a)(4), the purpose of this executive session is to provide the Board with a briefing regarding a County Attorney opinion. This briefing and consultation involves the consideration of the powers, duties, privileges, immunities and/or liabilities of the Board and the Department as they relate to this agenda item

At 4:50 p.m., Vice Chair, Mr. Nakaya called the Regular Meeting back into session.

Re: Manager's Report No. 13 – 1- (revised) Points of disagreement with the Kapa'a Highlands Proposal

Mr. Dahilig moved to decline negotiations and rescind the Board to stand on the last submittal of the Revised Subdivision Report to the Planning Department dated October 9, 2007 to the original seven conditions; seconded by Mr. Nishimura; 3 ayes and 1 nay from Mr. Dill.

Mr. Dahilig referred to the Revised Subdivision Report dated October 9, 2007 and the set of conditions. If in the absence of non-portable water through a ditch system they would have to develop the adequate source of storage with request to meeting the differential that was originally proposed.

Mr. Nishimura stated between now and Monday all the outstanding concerns with DOW can be resolved which might put the DOW at further risk. He is supporting Mr. Dahilig's motion. Deputy County Attorney, Andrea Suzuki stated the deadline is not on the Board but on the applicant.

Mr. Dill asked if action can be deferred. Mr. Dahilig feels it would not be prudent to continue this course of action under the circumstances the Board is under.

At 5:08 p.m., Vice Chair, Mr. Nakaya recessed the Regular Meeting while Deputy County Attorney Andrea Suzuki refers to Board ordinance regarding no majority vote.

At 5:26 p.m., Vice Chair Mr. Nakaya called the Regular Meeting back to session.

Deputy County Attorney, Andrea Suzuki stated for the record, motion is terminated with no majority vote and to continue/maintain the status quo "the state of affairs that existed previously and continue negotiation."

Mr. Dill stated he is not prepared at this time to reconsider his vote. There are still possibilities for negotiations. If the Board continues to negotiate with the applicant, as the Deputy County Attorney indicated, the deadline is on the applicant with Planning Commission. This has no bearing on the Board to make a decision and that gives a window for these negotiations which may not happen because the DOW has concern and that the Board and the Deputy County Attorney just received the agreement. We should give the applicant the respect to look at the document and to respond to it stated Mr. Dill.

At 5:30 p.m., Board Member, Mr. Dill exits.

At 5:30 p.m. Chair Kaneshiro resumes the agenda items and moves to item I. Staff Reports

STAFF REPORTS

Re: Statement of Kaua'i County Water Department's Revenues and Expenditures

Manager Craddick reported there is an ending balance of \$2 million. The auditors will be here in two weeks. Mr. Nishimura asked if all of the outstanding audit issues were resolved in the audit report. Mr. Craddick responded that the main issue was Fire and they have been billed with

DEPARTMENT OF WATER

County of Kaua'i

"Water has no Substitute - Conserve It!"

MANAGER'S REPORT No. 13-1 (revised):

August 21, 2012

Re: Points of disagreement with Kapa'a Highlands proposal

<u>UPDATE</u>: 8/14/12 – After a meeting with DOW Staff and Max W. J. Graham, Jr. a resolution to this proposal may preside between 8/14/12 and 8/21/12. Should a proposed agreement be drafted before the meeting, a hard copy will be provided for the Board. Although the Board asked for concurrence, we are still trying to arrive at mutually agreeable terms.

BACKGROUND:

On the July 23rd recessed Regular Board meeting, the board has requested to clarify:

- a. Understanding the affordable housing component of the application in terms of number of units/percentage.
- b. The items that the department does not agree with the applicants and the reasons where they do not agree and concurrence from the applicant that they agree that these are the disagreements
- c. Concurrence from the applicant on the items there is disagreement.
- 1. We are unsure of the amount of affordable housing to be provided above and beyond the requirements of the County's Housing Ordinance. Kapa'a Highlands is saying they will provide the minimum required by County ordinance.
- DOW has never given an allocation of resources or committed water before a project has zoning. Kapa'a Highlands is requesting an allocation of resources before getting zoning for its project.
- 3. We are asking for a Master plan revision to reflect the revised plan.
 - Kapa'a Highlands does not want to provide a revised master plan. The third MOU submitted on or about June 15, 2012 by Max Graham's office states that they want the Department to agree to provide water meters together with all of the their potable, agricultural and fire protection needs for phase 1, the "residential project" and Phase II if the applicant has bonded the FRC. The FRC should be paid (in full) prior to DOW building permit approval and DOW water meter approval. Bonding for FRC should not be allowed as a substitute for full payment for building permit and water meter service. The Rules/ Subdivision Ordinance only allow the FRC to be bonded for Final Subdivision map approval by the Planning Commission. The Rule further says that the FRC must be paid and necessary (bonded) water system improvements must be completed and accepted prior to water meter approval.
- 4. DOW is restricting where storage resources will come so all resources which were installed to meet county affordable housing requirements are not used by a single developer until zoning is approved.

Manager's Report No. 13-1 Points of Disagreement with the Kapaa Highlands Proposal August 21,2012 Page 2 of 2

Kapa'a Highlands does not agree with DOW and wants all available resources at a certain elevation.

5. DOW wants payment as storage is constructed and if already constructed payment immediatly.

Developer wants to pay as meters are taken. The third MOU states that the Department agrees to provide water meters together with all of their potable, agriculture and fire protection needs if the applicant bonds the construction of the water improvements. The Rules/Subdivision Ordinance only allows the posting of a bond for the construction and completion of necessary water facilities for Final Subdivision map approval. The necessary water facilities and improvements (on-site and off-site) for the "residential project" should be constructed, completed and accepted prior to building permit and/or water meter approval.

- 6. DOW standards require well site to be conveyed fee simple.

 Kapa'a Highlands latest proposal is to convey a site easement and not fee simple.
- 7. DOW rules require construction and conveyance of water system facilities (distribution, transmission, source and storage) prior to issuance of water service.
 Kapa'a Highlands latest proposal is that water service for Phase I not be dependent on actual construction of water system facilities.
- 8. DOW has offered to explore the possibility of bonding and cost sharing of the Kapahi 325' Tanks that are currently in design to satisfy the storage requirements for the current 13 lot subdivision that has tentative subdivision approval. Cost sharing for the existing Stable 214' Tanks is not acceptable as there is not enough excess capacity in this system. Cost share of the Kapahi 325' Tank for the residential project may be a possibility once the property is zoned for the residential project and at the time of subdivision.

Kapa'a Highlands latest proposal to provide project storage capacity for the Residential and Phase II states the Applicant will pay the "...proportionate share of the total construction costs for existing or new water tanks owned by the Department..."

Respectfully Submitted:

David R. Craddick P.E., C.E.M. Manager and Chief Engineer

Mgrrpt/August 2012/13-1 (revised) Points of disagreement with Kapa'a Highlands proposal (8-21-12) mjg

Bernard P. Carvalho, Jr.

Mayor

Gary K. Heu Managing Director



PLANNING DEPARTMENT

County of Kaua'i, State of Hawai'i

4444 Rice Street, Suite A-473, Lihu'e, Hawai'i 96766 TEL (808) 241-4050 FAX (808) 241-6699 RECEIVED FOR THE RECORD

Michael A. Dahilig
Interim Director of Planning

AUG 21 2012

Dee M. Crowell
Deputy Director of Planning

August 31, 2011

Max W. J. Graham, Jr.
BELLES GRAHAM PROUDFOOT WILSON & CHUN, LLP.
Watumull Plaza
4334 Rice Street, Suite 202
Līhu'e, Hawai'i 96766-1388

Subject:

KAPA'A HIGHLANDS SUBDIVISION – Subdivision of Parcel 1, Being a Portion of Grant 5266 to Rufus P. Spalding Into Lots 1 to 13, Inclusive, Kapa'a and Waipōuli, Kaua'i, Hawai'i. (S-99-45, Allen Family LLC/Moloa'a Bay Ventures, LLC/Three Stooges, LLC)

An extension until **AUGUST 31, 2012** to file final subdivision maps has been approved by the Planning Commission at their meeting held on August 30, 2011. The Applicant shall submit an updated status report on the subdivision that includes a detailed time chronology on the progress of the tentative approval requirements and it shall be submitted to the Planning Department no later than six (6) months from that date of the extension approval.

MICHAEL A. DAHILIG Interim Director of Planning

xc:

CoK - Public Works Dept.

CoK - Water Dept.

CoK - Real Property Div. - Assessment

State Health Dept.

REVISED SUBDIVISION REPORT

RECEIVED FOR THE RECOR AUG 2 1 2012

TO: FROM:

2.

TMK: 4-3-03:001

PLANNING DEPARTMENT

DEPARTMENT OF WATER

SURVEYOR: R. Wagner

REVISED REPORT NO. S-99-45

| 1. | Domestic water is adequate. | Tentative approval is recommended. | \boxtimes |
|----|-----------------------------|------------------------------------|-------------|
|----|-----------------------------|------------------------------------|-------------|

All requirements have been fully met and, therefore, Final Approval is recommended. 3. Before final approval can be recommended, the subdivider must:

NAME: SILAGI FAMILY TRUST

Pay the Department of Water (DOW) the following charges in effect at the time of receipt. At the present time, these charges include:

X

П

| 11 | The Facilities | Recente | Charge | <i>Œ</i> ዌረን- |
|----|----------------|---------|--------|---------------|
| 1) | THE LACHHIES | Veserre | Charge | (TAU). |

13 lots @ \$4,600 per lot

\$ 59,800

37 additional units @ \$4,600 per unit \$170,200

Total FRC required \$230,000

Prepare and receive Department of Water's approval of construction drawings for the necessary water system facilities and either construct said facilities or post a performance bond for construction. These facilities shall also include:

X

- 1) Main extensions along Olohena Road, west of Kaapuni/Olohena Road intersection shall be a minimum of 8-inches in diameter. Main extensions shall be connected to appropriate connection points.
- 2) The fire service connections.
- 3) Additional storage facilities must be provided.
- 4) Additional source facilities must be provided. (This condition satisfied by Kapa'a Homesteads Well #2).
- 5) The non-potable water system shall be shown on the drawings.
- 6) The interior plumbing plans with the appropriate backflow assemblies for all meters to the subdivision.
- Prepare and convey to the Department of Water a right-of-entry and temporary grant of easement for the purpose of construction, repair, maintenance, and operation of the subdivision water system improvements installed in other than County-owned property, if applicable.

X

If a bond is filed, to secure final subdivision approval, the subdivider shall clearly letter the following on the approved construction plans, final subdivision map, and deeds:

X

"Domestic water service will not be available until the required construction improvements for this subdivision are completed and accepted by the Department of Water. County of Kauai."

This deed restriction shall be recorded with the Bureau of Conveyances within ninety (90) days of final subdivision approval by the Planning Department.

Other (or remarks): 4.

 \boxtimes

- For lots with service connections below 40 psi (minimum of 35 psi), lot owners shall complete an "Elevation Agreement" with the Department of Water, County of Kauai. This shall be done prior to any building permit or water meter approvals. This deed restriction shall be recorded with the Bureau of Conveyances within ninety (90) days of final subdivision approval by the Planning Department. The affected lots shall be clearly identified on the approved construction drawings and final subdivision map.
- Lots 13, 16, 17, and Lot 18 are for roadway purposes and will not require water service from the Department of Water, County of Kaua'i (DOW).
- Lot 14 is for AC Walk purposes for the Kapaa Middle School and will not require water service from the
- A licensed engineer shall design the non-potable water facilities required for the subdivision, in accordance with the Department's 2002 Water System Standards. The approved Water Master Plan for S-99-49 and S-99-45 addressed the non-potable supply for the subdivision. If the non-potable supply for S-99-45 will not be obtained from the source indicated in the Water Master Plan, either the Water Master Plan shall be amended to reflect the change or, the applicant shall submit an engineering report for the proposed subdivision non-potable water system to the DOW for review and approval. If an engineering report is submitted, the Department's comments are subject to change.

This deed restriction shall be recorded with the Bureau of Conveyances within ninety (90) days of final subdivision approval by the Planning Department.

Gregg Fujikawa

10-9-07

SUBDIVISION REPORT NO. 99-45

Chief of Water Resources and Planning

BELLES GRAHAM PROUDFOOT

WILSON & CHUN, LLP

MICHAEL J. BELLES MAX W.J. GRAHAM, JR. DONALD H. WILSON JONATHAN J. CHUN

Federal I.D. No. 99-0317663

ATTORNEYS AT LAW

WATUMULL PLAZA 4334 RICE STREET, SUITE 202 LIHUE, KAUAI, HAWAII 96766-1388

> TELEPHONE NO: (808) 245-4705 FACSIMILE NO: (808) 245-3277 E-MAII.: mail@kauai-law.com

August 20, 2012

OF COUNSEL
DAVID W. PROUDFOOT

COUNSEL LORNA A. NISHIMITSU

VIA EMAIL ONLY

Mr. David R. Craddick
Manager & Chief Engineer
Department of Water
County of Kauai

P. O. Box 1706 Lihue, Kauai, Hawaii 96766

Re:

Kapaa Highlands Subdivision (S-99-45)

(fna Kūlana Kai/Kauai Highlands)

Subdivision Of Parcel 1 Being A Portion Of

Grant 5266 To Rufus P. Spalding Into Lots 1 To 18, Inclusive

Kapaa and Waipouli, Kauai, Hawaii

Kauai Tax Map Key No. (4) 4-3-003:001 (por.)

Owner: Allen Family LLC; Moloaa Bay Ventures, LLC; and

The Three Stooges LLC

Dear Mr. Craddick:

Mr. Greg Allen, Jr. will be presenting the following materials at the meeting of the Board of Water Supply scheduled for Tuesday, August 21, 2012:

- 1. Kapaa Highlands Water Agreement (clean/redlined).
- Summary of Kapaa Highlands Water Agreement.

I have made changes to the prior draft of the Water Agreement that address some, but not all, of the issues raised in your Manager's Report No. 13-1 (revised) dated August 21, 2012.

Mr. David R. Craddick Manager & Chief Engineer Department of Water August 20, 2012 Page 2

Thank you for your cooperation in this matter.

Sincerely yours,

BELLES GRAHAM PROUDFOOT WILSON & CHUN, LLP

Max W. J. Graham, Jr.

MWJG:jgm Enclosures

cc: Mr. Greg Allen, Jr., w/encls. (via email only)

Andrea A. Suzuki, Esq., w/encls. (via email only)
Mr. William Eddy, DOW, w/encls. (via email only)
Mr. Gregg Fujikawa, DOW, w/encls. (via email only)

LAND COURT SYSTEM

REGULAR SYSTEM

After Recordation, Return by: Mail (X) Pickup () BELLES GRAHAM PROUDFOOT WILSON & CHUN, LLP (mwg) 4334 RICE STREET SUITE 202

LIHUE KAUAI HI 96766 PHONE: (808) 246-6962

This document contains _____ pages.

TYPE OF DOCUMENT:

KAPAA HIGHLANDS WATER AGREEMENT

PARTIES TO DOCUMENT:

APPLICANT: ALLEN FAMILY, LLC, an Arizona limited liability

company; MOLOA'A BAY VENTURES, LLC, a Hawaii limited liability company; and THE THREE STOOGES

LLC, a Hawaii limited liability company

161 Wailua Road

Kapaa, Kauai, Hawaii96746

DEPARTMENT OF WATER: DEPARTMENT OF WATER,

COUNTY OF KAUAI

P. O. Box 1706

Lihue, Kauai, Hawaii96766

TAX MAP KEY FOR PROPERTY:

(4) 4-3-003:001

KAPAA HIGHLANDS WATER AGREEMENT

THIS KAPAA HIGHLANDS WATER AGREEMENT ("Agreement") is entered into by and between ALLEN FAMILY, LLC, an Arizona limited liability company, MOLOA'A BAY VENTURES, LLC, a Hawaii limited liability company, and THE THREE STOOGES LLC, a Hawaii limited liability company, all of whose mailing address is 161 Wailua Road, Kapaa, Kauai, Hawaii 96746 (collectively, the "Applicant"), and the DEPARTMENT OF WATER, COUNTY OF KAUAI, whose mailing address is P. O. Box 1706, Lihue, Kauai, Hawaii 96766 ("Department").

1. RECITALS

- 1.1 <u>Kapaa Highlands</u>. The Applicant is the developer and owner of that certain real property known as the Kapaa Highlands located in Kapaa, Kauai, Hawaii, identified by Kauai Tax Map Key No. (4) 4-3-003:001 ("Property").
- 1.2 <u>Subdivision</u>. The Applicant has filed an application with the Planning Commission of the County of Kauai (hereinafter called the "Planning Commission") under Planning Commission Subdivision No. S-99-45 for the subdivision of the Property into Lots 1 to 18 ("Subdivision Lots"), inclusive, of the Kapaa Highlands Subdivision (hereinafter called the "Subdivision"). The Subdivision Lots are described as: 12 Agricultural Lots (with a maximum density of 50 farm dwelling units); 1 Road Lot; 1 Sidewalk Lot; and 4 Remnant Lots.
- Approval for the Subdivision as set forth in that certain letter dated April 1, 2001, from the Planning Director, County of Kauai, and as amended by a Revised Subdivision Report dated October 9, 2007 from the Department (jointly, the "Department's Initial Subdivision Report"), require the Applicant to make improvements to the Department's public water system in the Kapaa Area, including source, storage and transmission facilities, as a condition of obtaining final approval of the Subdivision. In addition, the Department's Initial Subdivision Report requires the Applicant to prepare a "Water Master Plan" detailing water demand calculations and proposed water infrastructure improvements for any development beyond the Subdivision as approved by the Department.
- 1.4 <u>Residential Project</u>. The Applicant is presently applying for necessary land use approvals to develop an approximately 97 acre portion of the Property (which includes Subdivision Lots 6 through 12) into an approximately 816 unit residential planned community development known as the Kapaa Highlands Residential Project containing: single-family detached and attached dwelling units; multi-family dwelling units; and affordable housing units (collectively, the "Residential Project").

- 1.5 <u>Applicant's Proposed Development Schedule</u>. The Applicant proposes to develop the Property as follows:
- a. <u>Subdivision Phase I.</u> Phase I of the Subdivision will consist of: Agricultural Lots 1 through 5 (containing a maximum of 16 farm dwelling units); Road Lot 13 (Kapaa Bypass Road); Sidewalk Lot 14; and Remnant Lots 15 through 18 (collectively, the "Phase I Lots").
- b. <u>Subdivision Phase II</u>. Phase II of the Subdivision will consist of Agricultural Lots 6 through 12 (containing a maximum of 34 farm dwelling units) ("Phase II Lots").
- c. Residential Project. If the Applicant is able to obtain the necessary land use approvals for the land encompassed by Subdivision Lots 6 through 12 ("Residential Project Area"), then the Applicant intends to develop the Residential Project on the Residential Project Area. Such land use approvals include: the redistricting of the Residential Project Area by the State Land Use Commission ("SLUC") into the Urban District; and the rezoning of the Residential Project Area by the Council of the County of Kauai ("County Council") into the Residential District (jointly, the "Land Use Approvals"). The Residential Project will consist of approximately 769 single family and multiple family dwelling units. Up to thirty percent (30%) of the units will be offered at the rental and/or sales prices for Workforce Housing contained in the Housing Policy of the County of Kauai (Ord. No. 860). The remainder will be offered at prices affordable to moderate income families with the primary focus being Kauai residents.
- 1.6 <u>Department Tanks</u>. The Department owns and operates water <u>tank storage</u> <u>sitestanks</u> ("Department Tanks") including a water tank known as the "Stable Tank" which <u>havehas</u> the potential of storing and providing water for some or all of the water service requirements of the Subdivision and of the Residential Project. However, no. The Department is also considering the development of a new water tank known as the "Ornellas Tank" which, if <u>constructed</u>, could provide water storage capacity <u>from existing Department storage tanks is currently allocated</u> for the <u>proposed</u> Subdivision <u>and Residential Project</u>.
- 1.7 Well System. The Applicant has the ability to develop a new well and related facilities ("Well System") on the Property which could produce potable water at the rate of at least 500 gallons per minute (gpm). The Applicant is willing to develop this Well System and convey it to the Department (at no cost) in exchange for the Department's agreement to provide water storage in the Stable Tank (for the Subdivision) and in the Ornellas Tank (for the Residential Project), provided that the Applicant pays its pro-rata share of the Construction Costs (as defined herein) for such storage capacity.
- <u>1.8</u> <u>Modification of Requirements</u>. Pursuant to the provisions of Part 3, Section XII of the Department's Rules and Regulations ("Department Rules"), the Department has agreed to revise certain of the requirements contained in the Department's Initial Subdivision Report (including those relating to source and storage) in exchange for water source capacity to

be provided by the Applicant to the Department. The new, revised requirements shall be contained in a new Subdivision Report which shall be in the form shown on Exhibit "A", attached hereto and incorporated herein ("Department's New Subdivision Report").

4.81.9 Water Service. In consideration of the Applicant's performance of its duties under the terms and conditions of this Agreement, the Department will specifically provide water storage system capacity for potable uses, agricultural uses and fire protection as required for Phase I and for Phase II, and potable uses and fire protection for the Residential Project, as provided herein. The agricultural water demands for Phase I ("and Phase I Water Demand"), Phase II ("Phase II Water Demand"), and the Residential Project ("Residential Project Water Demand") II shall be based on the Goat Project described in the Kapaa Highlands Agricultural Master Plan (6/1/07) filed by the Applicant with the Planning Commission in the Subdivision matter (which will involve 356 goats). The water requirement for each goat is deemed to be ten (10) gallons per goat per day. The water demand for the Residential Project shall be determined at the time the Department approves the installation of the water meters, and shall be based on standard water consumption standards as contained in the Department Rules, and. These water demands are further described as follows:

a. <u>Phase I Water Demand</u>. <u>Sixteen (16) farm dwelling units and up to 50 acres of agricultural lands. (Lots 1-5).</u>

| <u>(i)</u> | Potable Water | | |
|--------------|------------------------|---|------------|
| | 16 units x 750 gpd | = | 12,000 gpd |
| <u>(ii)</u> | Ag Water (Goats) | | |
| | 130 goats (50.853 ac.) | = | 1,300 gpd |
| <u>(iii)</u> | Total Water Service | = | 13,300 gpd |

b. <u>Phase II Water Demand</u>. Thirty four (34) farm dwelling units and up to 85 acres of agricultural lands (Lots 6-12).

```
      (i)
      Potable Water

      34 units x 750 gpd
      =
      25,500 gpd

      (ii)
      Ag Water (Irrigation)

      226 Goats (88.642 ac.)
      =
      2,260 gpd

      (iii)
      Total Water Service
      =
      27,760 gpd
```

c. <u>Residential Project Water Demand</u>. <u>Eight hundred sixteen (816)</u> single family and multi family dwelling units.

| <u>(i)</u> | Single family residential | = | 86 units |
|--------------|-----------------------------|---|------------------|
| | | | |
| <u>(ii)</u> | Multiple family residential | = | <u>683 units</u> |
| | | | |
| | Total | = | 769 units |
| | | | |
| (iii) | Other | | |
| \ | | | |
| | Parks | = | 3.1 ac. |
| | Church | = | 0.8 ac. |
| | Gen. Commercial | = | 0.4 ac. |
| | Roads | = | 9.4 ac. |
| | Open Space | = | 14.3 ac. |
| | | | |
| <u>(iv)</u> | Water Service | | |
| | | | |
| | Maximum Day | = | 448,275 gpd |

1.92.0 <u>Housing Policy</u>. In further consideration of this Agreement, the Applicant agrees to satisfy all of the requirements of the Housing Policy of the County of Kauai (Ordinance No. 860) applicable to Phase I, Phase II, and the Residential Project.

2. APPLICANT'S DUTIES

In order to fulfill its duties and obligations under this Agreement, the Applicant agrees to do the following (collectively, the "Applicant's Duties"):

2. WELL SYSTEM

- 2.1 <u>Well Facilities</u>. The Applicant shall develop and construct a well with a minimum diameter of twelve (12) inches ("Well"), pump facilities (including two pumps), electrical and electronic facilities, an emergency generator, and related structures and facilities (collectively the "Well Facilities") on the Property in an area designated as the "Well Site" in accordance with Department standards. The Well Facilities shall be tested per Department standards to determine the sustainable yield.
- 2.2 <u>Transmission Line</u>. The Applicant shall develop and construct a water transmission line ("Transmission Line") connecting the Well Facilities to the Department's existing 16" diameter waterline on Olohena Road ("Olohena Waterline"). The Transmission Line shall be sized per the DOW approved Water Master Plan.

- 2.3 <u>Electrical Transmission Facilities</u>. The Applicant shall develop and construct electrical and electronic transmission lines, poles, conduit and related facilities ("Electrical Transmission Facilities") necessary to provide the Well Facilities with all required electrical power and phone and electronic communications services. The Applicant will grant the Kauai Island Utility Cooperative ("KIUC") such easements over the Property as may be required by KIUC for the Electrical Transmission Facilities. The Electrical Transmission Facilities shall be constructed in accordance with KIUC standards pursuant to construction and engineering plans approved by KIUC. Provided, however, that the Electrical Transmission Facilities shall not include any SCADA equipment, communication facilities, or data transmission devices.
- 2.4 <u>Well Site</u>. The Applicant shall convey to the Board of Water the Well Site as an exclusive, perpetual easement ("Well Site Easement"). The location of the Well Site shall not be determined until the Applicant has constructed a Well that meets the requirements of this Agreement. The Applicant shall convey the Well Site Easement before receiving Certificate of Completion from the Department. The Well Site Easement shall provide that the Department has the right to further subdivide the Well Site from the Property, and that Applicant will cooperate in any such subdivision and will convey fee simple title to the Well Site lot to the Board of Water.
- 2.5 <u>Easements</u>. The Applicant shall convey the following perpetual grants of easements ("Easements") to the Board of Water:
- a. The Well Site Easement, which shall be a perpetual, exclusive easement for the Well Site;
- b. A perpetual, nonexclusive easement for the portions of the Transmission Line located on the Property;
- c. A perpetual, nonexclusive easement for the portions of the Electrical Transmission Facilities located on the Property; and
- d. Perpetual, nonexclusive easements for vehicular and pedestrian access to the Well Site, Transmission Line, and Electrical Transmission Facilities. Any access road to the Well Site shall be a gravel roadway.
- 2.6 <u>Well System</u>. The Well, Well Facilities, Transmission Line, Electrical Transmission Facilities, Well Site, and Easements shall be referred to collectively as the "Well System".
- 2.7 <u>Department Standards</u>. The Applicant shall construct the Well System in accordance with the Water System Standards and pursuant to construction and engineering plans approved by Department and prepared by an engineer licensed in Hawaii. Furthermore, the Well System shall be constructed in accordance with the standards of the State of Hawaii, Department

of Health and Commission on Water Resource Management. The said constructed Well System shall have water quality equal or better than existing Department wells in the Wailua-Kapaa area.

2.8 <u>Final Subdivision Requirements</u>. Prior to final approval of the Subdivision by the Planning Commission, the Applicant shall: either complete the requirements contained in the Department's New Subdivision Report and receive a Certificate of Completion for required water improvements; or (in order to secure final approval prior to construction of the required water improvements) enter into a construction agreement and bond pursuant to the Department Rules, Part III, Section XII. If a bond is filed to secure final Subdivision approval, the Applicant shall clearly letter the following on the approved construction plans, final subdivision map and deeds:

"Domestic water service will not be available until the required construction improvements for this subdivision are completed and accepted by the Department of Water, County of Kauai."

The deed restriction shall be recorded with the Bureau of Conveyances within (90) days of final subdivision approval by the Planning Department. The Applicant shall complete any and all other Department subdivision conditions for the subdivision.

- 2.9 <u>Booster Pumps</u>. The Applicant shall be solely responsible for installing booster pumps, pressure tanks, backflow preventers and/or other related facilities for all water meters servicing dwelling units on the Property which are located at elevations such that the water pressure will be less than that required by Department standards. Each parcel with the potential for substandard water pressure as determined by the Department shall have an "Elevation Agreement" pursuant to the Department Rules, Part II, Section IV and Part III, Section IX. Lot owners shall complete an "Elevation Agreement" with the Department of Water, County of Kauai. The agreement shall be completed prior to building permit or water meter approvals. A deed restriction describing the elevation agreement condition shall be recorded with the Bureau of Conveyances within (90) days final subdivision approval by the Planning Department and clearly lettered on the final subdivision map.
- 2.10 <u>Water Master Plan</u>. The Applicant has prepared and submitted to the Department a final Water Master Plan dated May 2009 (Revised June 2012) that describes all of the water facilities required for the subject Subdivision and Residential Project. The Department agrees to accept this Water Master Plan (as revised) as complying with the Department's requirements for final subdivision approval.

2.11 Storage.

<u>a.</u> The <u>Department will allow the</u> Applicant will pay its pro-rata share of the costs of constructing ("Construction Costs") any water tanks owned by the Department ("Department Tanks") which are used by the Applicant to meet the water storage requirements for ("Water Storage Requirements") Phase I, Phase II and/or the Residential Project. Such

Construction Costs shall include any and all costs reasonably incurred by the Department in constructing such Department Tanks, including but not limited to: engineering, architectural, legal and other professional fees; site preparation; contractor's fees; labor and material costs; and any other associated fees and costs.

3. DEPARTMENT'S DUTIES

<u>Construction Costs for storage only if the Applicant participates in the construction of the Department Tanks as provided in this Agreement. If the Applicant does not pay the Construction Costs at the time the new Department Tank is being constructed (including the Ornellas Tank), then no storage in the new Department Tank will be allocated to enter Phase II (Lots 6-12) or the Residential Project. In such case, the Applicant's right to use the then existing storage (if any) available in the Department's public water system or any future storage will be subject to the standard rules and requirements of the Department.</u>

In order to fulfill its duties and responsibilities under this Agreement, and pursuant to its powers as set forth in Part 3, Section XII of the Department Rules, the Department agrees to do the following (collectively the "Department's Duties"):

3. SUBDIVISION/WATER METERS

- 3.1 <u>Department Subdivision Requirements</u>. The Department agrees to submit to the Planning Commission with regards to the Subdivision the Department's New Subdivision Report in the form attached hereto and incorporated herein as Exhibit "A"-, which contains the following requirements:
- a. The Applicant will pay the applicable Facility Reserve Charges ("FRC") (Transmission) for 8 additional meters for Lots 1-12. The parties understand and agree that there are already 4 meters at the Property.
 - b. The Applicant will construct or bond:
- (i) Main off-site Extensions along Olohena Road (8" diameter) to appropriate connection point.
 - (ii) Fire Service connections.
 - (iii) On-site water improvements.
 - (iv) Well System.
 - c. The Applicant and the Department will enter into this Agreement.
- d. The Applicant will pay for its pro-rata share of the Construction Costs for storage requirements for 7 meters in the Stable Tank.

<u>e.</u> <u>The Department will allow the Applicant to provide agricultural water needs for the Subdivision from the Department's water system based on the Goat Project. The Goat Project water needs are 10 gpd for each of the 356 goats for a total of 3,560 gpd.</u>

- 3.2 <u>Phase I Water Meters</u>. The Department agrees to provide <u>1612 additional</u> water meters within Lots 1 through 5 <u>(in addition to the 4 meters already on these lots)</u> for the 16 farm dwelling units proposed thereon, together with all of their potable, agricultural and fire protection needs ("Phase I Water Service") subject to the following conditions:
- a. The Applicant has paid or bonded the Facilities Reserve Charge ("FRC") applicable to the Department's transmission facilities in effect at the time of payment for 16pays the applicable FRC for the 12 additional water meters.
- b. The Applicant completes the Well System; the Applicant dedicates the Easements, Well Site, Well Facilities and Transmission Line to the Department; the Department accepts the dedication of the Easements, Well Site, Well Facilities and Transmission Line; and the Department has issued a Certificate of Completion for the Well System.
- c. The Applicant either constructs the water improvements for the Subdivision as set forth in the Department's New Subdivision Report or bonds the construction of such facilities pursuant to the Subdivision Ordinance.
- d. The Applicant agrees that no water meters for Additional Dwelling Units ("ADUs") will be allowed.
- e. The Applicant agrees that there will be no water use on the 97 acre area that will be developed in Phase II unless the requirements set forth in Paragraphs 3.3 or 3.4 are fulfilled.
- f. The Applicant agrees that the County of Kauai ("County") shall not be required to approve or issue any water meters or building permits for dwelling units or other improvements in Phase I which require water service until Applicant fulfills the requirements of this Paragraph 3.2.
- g. The Applicant pays or bonds its pro-rata share of the Construction Costs of existing Department Tanksthe Stable Tank to meet the Phase I Water Storage Requirements, as determined by the Department.
- h. To the extent that the Well Capacity is sufficient to meet the Phase I Water Service Requirements, the Applicant shall not be required to construct or bond additional source facilities. If the Well System does not produce sufficient water for the Phase I Water Service Requirements, then Applicant agrees that it will be required to construct

additional source facilities or bond the cost of constructing additional source facilities before the Department will be obligated to provide Phase I Water Service.

- 3.3 <u>Phase II Water Meters</u>. The Department agrees to provide 34 water meters within Lots 6 through 12 for the 34 farm dwelling units proposed thereon, together with all of their potable, agricultural and fire protection needs ("Phase II Water Service") subject to the following conditions:
- a. The Applicant has paid the FRCs in effect (at the time of payment) for 34 water meters.
- b. The Applicant completes the Well System; the Applicant dedicates the Easements, Well Site, Well Facilities and Transmission Line to the Department; the Department accepts the dedication of the Easements, Well Site, Well Facilities and Transmission Line; and the Department has issued a Certificate of Completion for the Well System.
- c. The Applicant has completed the construction of the water improvements for the Subdivision as set forth in the Department's New Subdivision Report.
- d. The Applicant agrees that no water meters for ADUs will be allowed.
- e. The Applicant has: either paid or bonded the Applicant's pro-rata share of the Construction Costs for existing or new Department Tanks (including the Ornellas Tank) which may be necessary to meet the Phase II Water Storage Requirements, as determined by the Department; or has constructed such additional storage and related facilities as required by the Department. In either case, the Applicant shall not be entitled to Phase II Water Service until such storage facilities have been constructed and are in operation. Although the Applicant shall have the right to participate in the development of new Department Tanks (including the Ornellas Tank) as provided herein, the Department shall have the absolute discretion to determine when (if ever) and where to construct such new Department Tanks.
- f. Applicant agrees that the County shall not be required to approve or issue any water meters or building permits for dwelling units or other improvements in Phase II which require water service until Applicant fulfills the requirements of this paragraph.
- g. To the extent that the Well Capacity is sufficient to meet the Phase I and Phase II Water Service Requirements, the Applicant shall not be required to construct or bond additional source facilities. If the Well System does not produce sufficient water for the Phase I and Phase II Water Service Requirements, then Applicant agrees that it will be required to construct additional source facilities or bond the cost of constructing additional source facilities before the Department will be obligated to provide Phase II Water Service.

- 3.4 <u>Water Service for Residential Project</u>. The Department will provide the Residential Project with all of its potable and fire protection needs ("Residential Water Service") subject to the following conditions:
- a. The Applicant has paid the FRCs in effect (at the time of payment) for the water meters for dwelling units for which Residential Water Service is being sought.
- b. The Applicant completes the Well System; the Applicant dedicates the Easements, Well Site, Well Facilities and Transmission Line to the Department; the Department accepts the dedication of the Easements, Well Site, Well Facilities and Transmission Line; and the Department has issued a Certificate of Completion for the Well System.
- c. The Applicant has obtained the Land Use Approvals, subdivision approvals, and discretionary governmental permits (if any) necessary to develop the Residential Project ("Project Permits").
- d. The Applicant complies with any and all other Department requirements and conditions for the water facilities required by the Department for the Residential Project ("Project Water Facilities") which are necessary for the construction of the dwelling unit or facility for which Water Service is requested.
- e. The Applicant either constructs or, where applicable, bonds the construction of the necessary Project Water Facilities.
- f. The Water Service will be limited to not more than <u>eightseven</u> hundred <u>sixteen (816sixty-nine (769)</u>) dwelling units, and water demand from other project developments such as parks, commercial, church, landscaping shall be deducted from this amount.
- g. If the Applicant has not obtained the Project Permits within five (5) years of the date of this Agreement, then the Department shall have no obligation to provide Residential Water Service as described herein.
- h. The Applicant either has paid or bonded the Applicant's pro-rata share of the Construction Costs for existing or new Department Tanks (including the Ornellas Tank) which may be necessary to meet the Residential Water Storage Requirements, as determined by the Department, or has constructed such additional storage and related facilities as required by the Department. In either case, the Applicant shall not be entitled to Residential Water Service until such storage facilities have been constructed and are in operation. Although the Applicant shall have the right to participate in the development of new Department Tanks (including the Ornellas Tank) as provided herein, the Department shall have the absolute discretion to determine when (if ever) and where to construct such new Department Tanks.

- i. The Department agrees to <u>creditallow</u> the Residential Project <u>withto use</u> all Phase II Water Storage capacity which the Applicant has paid for <u>or bonded</u> pursuant to Section 3.3.e.
- j. The Department agrees to credit the Residential Project with: the amount of source from the Well System allocated to the Phase II Water Service Requirements; and any additional source facilities constructed or bonded by Applicant for the Phase II Water Service Requirements.
- ki. The Applicant agrees that the County shall not be required to approve or issue any building permits or water meters for dwelling units or other improvements in the Residential Project which require water service until Applicant fulfills the requirements of this Paragraph 3.3.
- Hk. The provisions of this Agreement shall not apply to any unbuilt dwelling units in the Residential Project unless building permit and zoning permit approvals for such dwelling units have been issued by the County within twenty (20) years of the date of this Agreement.

4. WELL CONTINGENCY SYSTEM CONTINGENCIES

4.1 Well Capacity. This Agreement is contingent on the proposed Well being capable of producing a minimum of five hundred (500) gallons per minute ("Well Capacity"). The Applicant shall have the duty of providing the Department with test results and technical data necessary to satisfy the Department that the Well will meet the Well Capacity. If the Department has not waived this contingency by approving the Well Capacity within two (2) years of the date of this Agreement, then either party shall have the right to cancel this Agreement by providing written notice of such cancellation to the other party.

4.2 Well System Reservation.

- <u>a.</u> The Applicant shall be entitled to receive the water from the Well System necessary to satisfy the Applicant's source requirements for Phase I (Lots 1-5), Phase II (Lots 6-12), and/or the Residential Project ("Source Reservation").
- b. The Department shall have the absolute right to use any water from the Well System in excess of the Source Reservation. In addition, the Department shall have the right to use on a temporary basis any water from the Well System that is not currently being used by the Applicant to satisfy its then current needs for Phase I, Phase II, and/or the Residential Project.
- <u>c. The Source Reservation shall end twenty (20) years after the dedication of the Well System to the Department. Thereafter, the Department shall be entitled to</u>

use all water from the Well System other than that already allocated to water meters that have been issued to Phase I (Lots 1-5), Phase II (Lots 6-12), and/or the Residential Project.

5. FRC OFFSET

The Applicant shall be eligible for an FRC Offset as allowed in the Department Rules, Part IV, Section VII, Paragraph 4, for the following:

- 1-a. The source component of FRCs for Phase I and Phase II to the extent that the Phase I and Phase II source needs are met by the Well System or by other source facilities constructed by the Applicant.
- 2.<u>b.</u> The storage component of FRCs for Phase I, Phase II and the Residential Project to the extent that Applicant has paid the Construction Costs of constructing the necessary storage facilities.

6. INDEMNIFICATION/RELEASE

- 6.1 <u>Indemnification</u>. The Applicant agrees to indemnify, defend, and hold the Department and the County harmless against all claims, suits and actions by whomsoever brought on account of injuries or damages to persons or property resulting from: the Department's and the County's approval of the Subdivision; or the terms of this Agreement (jointly referred to as the "Claim Events").
- 6.2 <u>Release Of Claims</u>. The Applicant hereby releases the Department and the County and the Department's and County's successors and assigns, from any and all liability, losses and damages arising out of or related to the Claim Events.
- 6.3 <u>Claim Exceptions</u>. The Applicant's indemnification under Paragraph 3 and release under Paragraph 4 (collectively, the "Claim Duties") shall be subject to the following restrictions and limitations:
- a. The Applicant shall have no Claim Duties for any injuries or damages caused by the intentional acts of the Department and the County or any person acting on behalf of the Department and the County, including but not limited to, the Department's and the County's agents, employees, officers, contractors or elected officials (collectively, the "Department/County Agents").
- b. In any case where the Claim Event arises out of the joint negligence of the Applicant or the Applicant's Agents ("Applicant Negligence") and the Department and the County or the Department/County Agents ("Department/County Negligence"), then, the Applicant shall only be responsible for its share of damages based on the relative degree of the Applicant's Negligence as compared to the Department/County Negligence.

7. MISCELLANEOUS

- 7.1 <u>Consents and Approvals</u>. No consent or approval required hereunder shall be unreasonably withheld, conditioned or delayed, and any consent or approval required hereunder shall be deemed to have been given if the party from whom such consent or approval has been requested in writing shall not have responded with a statement of specific objections to such request within fifteen (15) business days after receipt of such request.
- 7.2 <u>Partial Invalidity</u>. If any provision hereof or the application thereof to any person or circumstance shall to any extent be invalid or enforceable, the remaining provisions hereof, or the application of such provision to persons or circumstances other than those as to which it is invalid or unenforceable, shall not be affected thereby.
- 7.3 <u>Governing Law</u>. This Agreement shall be construed, interpreted and applied in accordance with the internal laws of the State of Hawaii without giving effect to doctrines relating to conflicts of laws.
- 7.4 <u>Costs of Enforcement</u>. In the event any party to this Agreement brings any suit or other proceeding with respect to the subject matter or enforcement of this Agreement, the prevailing party (as determined by the court, agency or other authority before which such suit or proceeding is commenced) shall, in addition to such other relief as may be awarded, be entitled to recover reasonable attorneys' fees, expenses and costs of investigation as actually incurred.
- 7.5 <u>Authority</u>. Each person signing this Agreement warrants and represents that he or she has authority to sign on behalf of himself or herself or of the entity he or she represents and that this Agreement has been validly authorized and constitutes a legally binding and enforceable obligation.
- 7.6 No Third Party Beneficiaries. No term or provision of this Agreement is intended to be, or shall it be, for the benefit of any person, firm, organization or corporation not a party hereto, and no such other person, firm, organization or corporation shall have any right or cause of action hereunder.
- 7.7 <u>Attachments/Schedules/Exhibits</u>. All attachments, schedules, exhibits and riders attached hereto and referred to herein are by this reference incorporated into this Agreement. If the provisions of any attachment, schedule, exhibit or rider to this Agreement are inconsistent with the provisions of this Agreement, the provisions of such attachment, schedule, exhibit or rider shall prevail.
- 7.8 <u>Interpretation of Terms.</u> As used in this Agreement, the masculine shall include the feminine and neuter, the singular shall include the plural and the plural shall include the singular, as the context may require. In any case where this Agreement is executed by more than one person as a party, the obligations hereunder shall be joint and several.

- 7.9 <u>Titles, Captions and Headings</u>. The titles, captions and headings of the articles, sections or subsections of this Agreement are for convenience only and shall not be considered or referred to in resolving questions of interpretation or construction.
- 7.10 <u>Modifications</u>. This Agreement may not be modified except by a written agreement signed by all parties.
- 7.11 <u>Binding on and Inuring to Benefit of Successors and Assigns.</u> This Agreement shall be binding upon, and shall inure to the benefit of the parties, and their respective successors and assigns.
- 7.12 Notices. All notices and other communications in connection with this Agreement shall be in writing and shall be deemed to have been received by a party (a) when actually received in the case of hand delivery or delivery by internationally recognized courier service, or (b) three (3) business days after being sent by United States mail, and shall be delivered or sent to the address of the Applicant or the Department as set forth below (or to such other address as may be specified by the Applicant or the Department by notice to the other parties) as the case may be. Any refusal to accept delivery of a written notice delivered or mailed to the addresses set forth below shall be deemed to be receipt of such notice for the purposes of this Agreement.

Applicant: Allen Family, LLC

Moloa'a Bay Ventures, LLC The Three Stooges LLC c/o Mr. Greg Allen, Jr. 161 Wailua Road

Kapaa, Kauai, Hawaii 96746

with a copy to: Max W. J. Graham, Jr., Esq.

Belles Graham Proudfoot Wilson & Chun, LLP

4334 Rice Street, Suite 202 Lihue, Kauai, Hawaii 96766

Department: Department of Water

P. O. Box 1706

Lihue, Kauai, Hawaii 96766

Attention: Mr. David Craddick, P.E. Manager & Chief Engineer

with a copy to: County of Kauai

Office of the County Attorney

Mo'ikeha Building

4444 Rice Street, Suite 220

Lihue, Kauai, Hawaii 96766 Attention: Alfred Castillo, Esq. County Attorney

- 7.13 <u>Counterparts</u>. This Agreement may be executed simultaneously in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Signature pages from separate signed copies may be attached to a single copy for purposes of recording.
- 7.14 <u>Terms</u>. All defined terms (such as "Applicant", "Water Board", "Department", "party", etc.), as and when used herein, or any pronouns used in place thereof, shall mean and include the masculine or feminine, the singular or plural number, individuals or corporation and their and each of their respective successors, heirs, personal representatives and assigns, according to the context thereof.
- 7.15 <u>Rule Against Perpetuities</u>. If any of the covenants, conditions, agreements, restrictions, limitations or other provisions of this Agreement shall at any time be interpreted or construed as unlawful, void or unenforceable for violation of the rule against perpetuities, then and in such case such covenant, condition, agreement, restriction, limitation or provision shall be construed and interpreted to continue only until the ninetieth (90th) anniversary of the effective date of this Agreement.

| F, the Applicant and the Department hat this day of | |
|---------------------------------------------------------|--|
| APPLICANT: | |
| ALLEN FAMILY, LLC, an Arizona limited liability company | |
| | |
| D | |

| STATE OF HAWAII |)) SS: | | |
|---------------------------------------|---------------------|-------------------------------------------------|---|
| COUNTY OF KAUAI |) 33. | | |
| On this | = | , 20, before me appear | |
| sworn or affirmed, did say t | | secuted the foregoing KAPAA HIGHLAN | • |
| · · · · · · · · · · · · · · · · · · · | • | , 20, which document consists | |
| | | person, and if applicable, in the capacity show | |
| having been duly authorized to | execute such instru | ament in such capacity. | |
| | Name | e of Notary: | |
| | Notar | ry Public, Fifth Judicial Circuit, | |
| | State of | of Hawaii. | |
| | Му со | commission expires: | |

APPLICANT:

MOLOA'A BAY VENTURES, LLC, a Hawaii limited liability company

| | By |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | Its |
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| | |
| STATE OF HAWAII |) |
| COUNTY OF KAUAI |) 55: |
| | day of, 20, before me appeared, to me personally known, who, being by me duly |
| WATER AGREEMENT date page(s), as the free a | that such person executed the foregoing KAPAA HIGHLANDS ted, 20, which document consists of act and deed of such person, and if applicable, in the capacity shown, |
| having been duly authorized | to execute such instrument in such capacity. |
| | |
| | Name of Notary: |
| | Notary Public, Fifth Judicial Circuit, State of Hawaii. |
| | My commission expires: |

APPLICANT:

THE THREE STOOGES LLC, a Hawaii limited liability company

| | | By |
|---------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------|
| | | Its |
| | | |
| | | |
| STATE OF HAWAII |)) SS: | |
| COUNTY OF KAUAI |) SS:) | |
| | | , 20, before me appeared , to me personally known, who, being by me duly |
| WATER AGREEMENT dat | ted | erson executed the foregoing KAPAA HIGHLANDS, 20, which document consists of f such person, and if applicable, in the capacity shown, |
| | | ch instrument in such capacity. |
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| | | Name of Notary: |
| | | Notary Public, Fifth Judicial Circuit, State of Hawaii. |
| | | My commission expires: |

| | DEPARTMENT: |
|-----------------------------------|----------------------------------------|
| | DEPARTMENTOF WATER, COUNTY OF KAUAI |
| | By |
| | Its Manager and Chief Engineer |
| | |
| | |
| APPROVED AS TO FORM AND LEGALITY: | |
| | |
| County Attorney, County of Kauai | |

| STATE OF HAWAII |)) SS. | | |
|-----------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------------|
| COUNTY OF KAUAI |) | | |
| | , to me personal and Chief Engineer of the executed the formula, 20_ Department of authent to be the free act | regoing KAPAA HIC, which document ority of said Department | by me duly sworn, did a WATER, COUNTY SHLANDS WATER consists ofent, and said officer |
| | Notary | of Notary: y Public, Fifth Judicial C of Hawaii. | ircuit, |
| | My co | ommission expires: | |

EXHIBIT "A"

REVISED SUBDIVISION REPORT

PLANNING DEPARTMENT

FROM: DEPARTMENT OF WATER **REVISED** TMK: 4-3-03:001 NAME: SILAGI FAMILY TRUST SURVEYOR: R. Wagner REPORT NO. S-99-45 1. Domestic water is adequate. Tentative approval is recommended. X 2. All requirements have been fully met and, therefore, Final Approval is recommended. 3. Before final approval can be recommended, the subdivider must: A. Pay the Department of Water (DOW) the following charges in effect at the time of X receipt. At the present time, these charges include: Five (5) units on Lots 1-5 will be served by Eleven (11) units on Lots 1 5 will pay Facility Reserve Charges (FRCs) for Transmission only the applicable Facility Reserve Charges ("FRC") for 12 meters (for Lots 1-12). Total FRC required: B. Prepare and receive Department of Water's approval of construction drawings for the X necessary water system facilities and either construct said facilities or post a performance bond for construction. These facilities shall also include: 1) Main extensions along Olohena Road, west of Kaapuni/Olohena Road intersection shall be a minimum of 8-inches in diameter. Main extensions shall be connected to appropriate connection points. 2) The fire service connections. 3) The Well System as described in the Kapaa Highlands Water Agreement. C. Prepare and convey to the Department of Water a right-of-entry and temporary grant of X easement for the purpose of construction, repair, maintenance, and operation of the subdivision water system improvements installed in other than County-owned property, if applicable. D. If a bond is filed, to secure final subdivision approval, the subdivider shall clearly letter X the following on the approved construction plans, final subdivision map, and deeds: "Domestic water service will not be available until the required construction improvements for this subdivision are completed and accepted by the Department of Water, County of Kauai."

TO:

This deed restriction shall be recorded with the Bureau of Conveyances within ninety (90) days of final subdivision approval by the Planning Department.

4. Other (or remarks):

X

- A. For lots with service connections below 40 psi (minimum of 35 psi), lot owners shall complete an "Elevation Agreement" with the Department of Water, County of Kauai. This shall be done prior to any building permit or water meter approvals. This deed restriction shall be recorded with the Bureau of Conveyances within ninety (90) days of final subdivision approval by the Planning Department. The affected lots shall be clearly identified on the approved construction drawings and final subdivision map.
- B. Lots 13, 16, 17, and Lot 18 are for roadway purposes and will not require water service from the Department of Water, County of Kauai (DOW).
- Lot 14 is for AC Walk purposes for the Kapaa Middle School and will not require water service from the DOW.
- D. The Subdivider shall execute that certain Kapaa Highlands Water Agreement ("Water Agreement") between the Subdivider and the Department of Water, County of Kauai, and submit an executed original to the Department of Water prior to final subdivision approval by the Planning Commission. The Water Agreement shall be recorded in the Bureau of Conveyances, State of Hawaii, within forty-five (45) days of final subdivision approval.
- E. Prior to installation of the eleven (11) additional water meters on Lots 1-5, the Applicant shall:
 - 1) Dedicate the Well System to the Department.
 - 2) Prepare and receive Department of Water's approval of construction drawings for the necessary source facilities (if additional source is required) and either construct said facilities or post a performance bond for construction.
 - 3) Pay or bond-its pro-rata share of the Construction Costs of existingthe
 Department-Tanks's Stable Tank to meet the Phase I (Lots 1-5) Water Storage
 Requirements, as determined by the Department
- F. Prior to installation of the thirty-four (34) water meters on Lots 6-12, the Applicant shall:
 - 1) Dedicate the Well System to the Department.
 - 2) Prepare and receive Department of Water's approval of construction drawings for the necessary source facilities (if additional source is required) and either construct said facilities or post a performance bond for construction.
 - 3) Pay or bond-its pro-rata share of the Construction Costs for existing or new Department Tanks (including the Ornellas Tank) which may be necessary to meet the Phase II (Lots 6-12) Water Storage Requirements, as determined by the Department. The Applicant shall not be entitled to Phase II Water Service until

REVISED

TMK: 4-3-03:001 NAME: SILAGI FAMILY TRUST SURVEYOR: R. Wagner REPORT NO. S-99-45

such storage facilities have been constructed and are in operation. Although the Applicant shall have the right to participate in the development of new Department Tanks as provided herein, the Department shall have the absolute discretion to determine when (if ever) and where to construct such new Department Tanks.

- 4) As an alternative to Paragraph F.2), the Applicant shall prepare and receive Department of Water's approval of construction drawings for the necessary water storage facilities and either construct said facilities or post a performance bond for construction.
- G. The Department will allow the Applicant to provide for the agricultural needs of the Subdivision from the Department's water system based on the Applicant's Goat Project (which shall be limited to 3,560 gpd).

| | | REVISED SUPDIVISION REPORT NO. 00.45 |
|---------------------------------------|------|--------------------------------------|
| Gregg Fujikawa | Date | SUBDIVISION REPORT NO. <u>99-45</u> |
| Chief of Water Resources and Planning | | |

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| Kapaa, Kau | iai, Hawaii 907 40 |
| DEPARTMENT OF WATER: | DEPARTMENT OF WATER, |
| | COUNTY OF KAUAI |
| | P. O. Box 1706 |
| | Lihue, Kauai, Hawaii96766 |
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KAPAA HIGHLANDS WATER AGREEMENT

THIS KAPAA HIGHLANDS WATER AGREEMENT ("Agreement") is entered into by and between ALLEN FAMILY, LLC, an Arizona limited liability company, MOLOA'A BAY VENTURES, LLC, a Hawaii limited liability company, and THE THREE STOOGES LLC, a Hawaii limited liability company, all of whose mailing address is 161 Wailua Road, Kapaa, Kauai, Hawaii 96746 (collectively, the "Applicant"), and the DEPARTMENT OF WATER, COUNTY OF KAUAI, whose mailing address is P. O. Box 1706, Lihue, Kauai, Hawaii 96766 ("Department").

1. RECITALS

- 1.1 <u>Kapaa Highlands</u>. The Applicant is the developer and owner of that certain real property known as the Kapaa Highlands located in Kapaa, Kauai, Hawaii, identified by Kauai Tax Map Key No. (4) 4-3-003:001 ("Property").
- 1.2 <u>Subdivision</u>. The Applicant has filed an application with the Planning Commission of the County of Kauai (hereinafter called the "Planning Commission") under Planning Commission Subdivision No. S-99-45 for the subdivision of the Property into Lots 1 to 18 ("Subdivision Lots"), inclusive, of the Kapaa Highlands Subdivision (hereinafter called the "Subdivision"). The Subdivision Lots are described as: 12 Agricultural Lots (with a maximum density of 50 farm dwelling units); 1 Road Lot; 1 Sidewalk Lot; and 4 Remnant Lots.
- Approval for the Subdivision as set forth in that certain letter dated April 1, 2001, from the Planning Director, County of Kauai, and as amended by a Revised Subdivision Report dated October 9, 2007 from the Department (jointly, the "Department's Initial Subdivision Report"), require the Applicant to make improvements to the Department's public water system in the Kapaa Area, including source, storage and transmission facilities, as a condition of obtaining final approval of the Subdivision. In addition, the Department's Initial Subdivision Report requires the Applicant to prepare a "Water Master Plan" detailing water demand calculations and proposed water infrastructure improvements for any development beyond the Subdivision as approved by the Department.
- 1.4 Residential Project. The Applicant is presently applying for necessary land use approvals to develop an approximately 97 acre portion of the Property (which includes Subdivision Lots 6 through 12) into an approximately 816 unit residential planned community development known as the Kapaa Highlands Residential Project containing: single-family detached and attached dwelling units; multi-family dwelling units; and affordable housing units (collectively, the "Residential Project").

- 1.5 <u>Applicant's Proposed Development Schedule</u>. The Applicant proposes to develop the Property as follows:
- a. <u>Subdivision Phase I.</u> Phase I of the Subdivision will consist of: Agricultural Lots 1 through 5 (containing a maximum of 16 farm dwelling units); Road Lot 13 (Kapaa Bypass Road); Sidewalk Lot 14; and Remnant Lots 15 through 18 (collectively, the "Phase I Lots").
- b. <u>Subdivision Phase II</u>. Phase II of the Subdivision will consist of Agricultural Lots 6 through 12 (containing a maximum of 34 farm dwelling units) ("Phase II Lots").
- c. Residential Project. If the Applicant is able to obtain the necessary land use approvals for the land encompassed by Subdivision Lots 6 through 12 ("Residential Project Area"), then the Applicant intends to develop the Residential Project on the Residential Project Area. Such land use approvals include: the redistricting of the Residential Project Area by the State Land Use Commission ("SLUC") into the Urban District; and the rezoning of the Residential Project Area by the Council of the County of Kauai ("County Council") into the Residential District (jointly, the "Land Use Approvals"). The Residential Project will consist of approximately 769 single family and multiple family dwelling units. Up to thirty percent (30%) of the units will be offered at the rental and/or sales prices for Workforce Housing contained in the Housing Policy of the County of Kauai (Ord. No. 860). The remainder will be offered at prices affordable to moderate income families with the primary focus being Kauai residents.
- 1.6 <u>Department Tanks</u>. The Department owns and operates water tanks ("Department Tanks") including a water tank known as the "Stable Tank" which has the potential of storing and providing water for some or all of the water service requirements of the Subdivision. The Department is also considering the development of a new water tank known as the "Ornellas Tank" which, if constructed, could provide water storage capacity for the Subdivision and Residential Project.
- 1.7 <u>Well System</u>. The Applicant has the ability to develop a new well and related facilities ("Well System") on the Property which could produce potable water at the rate of at least 500 gallons per minute (gpm). The Applicant is willing to develop this Well System and convey it to the Department (at no cost) in exchange for the Department's agreement to provide water storage in the Stable Tank (for the Subdivision) and in the Ornellas Tank (for the Residential Project), provided that the Applicant pays its pro-rata share of the Construction Costs (as defined herein) for such storage capacity.
- 1.8 <u>Modification of Requirements</u>. Pursuant to the provisions of Part 3, Section XII of the Department's Rules and Regulations ("Department Rules"), the Department has agreed to revise certain of the requirements contained in the Department's Initial Subdivision Report (including those relating to source and storage) in exchange for water source capacity to be provided by the Applicant to the Department. The new, revised requirements shall be

contained in a new Subdivision Report which shall be in the form shown on Exhibit "A", attached hereto and incorporated herein ("Department's New Subdivision Report").

duties under the terms and conditions of this Agreement, the Department will specifically provide water storage system capacity for potable uses, agricultural uses and fire protection as required for Phase I and for Phase II, and potable uses and fire protection for the Residential Project, as provided herein. The agricultural water demands for Phase I and Phase II shall be based on the Goat Project described in the Kapaa Highlands Agricultural Master Plan (6/1/07) filed by the Applicant with the Planning Commission in the Subdivision matter (which will involve 356 goats). The water requirement for each goat is deemed to be ten (10) gallons per goat per day. The water demand for the Residential Project shall be determined at the time the Department approves the installation of the water meters and shall be based on standard water consumption standards as contained in the Department Rules. These water demands are further described as follows:

a. Phase I Water Demand (Lots 1-5).

(i) Potable Water

16 units x 750 gpd = 12,000 gpd

(ii) Ag Water (Goats)

130 goats (50.853 ac.) = 1,300 gpd

(iii) Total Water Service = 13,300 gpd

- b. Phase II Water Demand (Lots 6-12).
 - (i) Potable Water

34 units x 750 gpd = 25,500 gpd

(ii) Ag Water (Irrigation)

226 Goats (88.642 ac.) = 2,260 gpd

(iii) Total Water Service = 27,760 gpd

c. Residential Project Water Demand.

- (i) Single family residential = 86 units
- (ii) Multiple family residential = 683 units

Total = 769 units

(iii) Other

 Parks
 =
 3.1 ac.

 Church
 =
 0.8 ac.

 Gen. Commercial
 =
 0.4 ac.

 Roads
 =
 9.4 ac.

 Open Space
 =
 14.3 ac.

(iv) Water Service

Maximum Day = 448,275 gpd

2.0 <u>Housing Policy</u>. In further consideration of this Agreement, the Applicant agrees to satisfy all of the requirements of the Housing Policy of the County of Kauai (Ordinance No. 860) applicable to Phase I, Phase II, and the Residential Project.

2. WELL SYSTEM

- 2.1 <u>Well Facilities</u>. The Applicant shall develop and construct a well with a minimum diameter of twelve (12) inches ("Well"), pump facilities (including two pumps), electrical and electronic facilities, an emergency generator, and related structures and facilities (collectively the "Well Facilities") on the Property in an area designated as the "Well Site" in accordance with Department standards. The Well Facilities shall be tested per Department standards to determine the sustainable yield.
- 2.2 <u>Transmission Line</u>. The Applicant shall develop and construct a water transmission line ("Transmission Line") connecting the Well Facilities to the Department's existing 16" diameter waterline on Olohena Road ("Olohena Waterline"). The Transmission Line shall be sized per the DOW approved Water Master Plan.
- 2.3 <u>Electrical Transmission Facilities</u>. The Applicant shall develop and construct electrical and electronic transmission lines, poles, conduit and related facilities ("Electrical Transmission Facilities") necessary to provide the Well Facilities with all required electrical power and phone and electronic communications services. The Applicant will grant the Kauai Island Utility Cooperative ("KIUC") such easements over the Property as may be required by KIUC for the Electrical Transmission Facilities. The Electrical Transmission

Facilities shall be constructed in accordance with KIUC standards pursuant to construction and engineering plans approved by KIUC. Provided, however, that the Electrical Transmission Facilities shall not include any SCADA equipment, communication facilities, or data transmission devices.

- 2.4 <u>Well Site</u>. The Applicant shall convey to the Board of Water the Well Site as an exclusive, perpetual easement ("Well Site Easement"). The location of the Well Site shall not be determined until the Applicant has constructed a Well that meets the requirements of this Agreement. The Applicant shall convey the Well Site Easement before receiving Certificate of Completion from the Department. The Well Site Easement shall provide that the Department has the right to further subdivide the Well Site from the Property, and that Applicant will cooperate in any such subdivision and will convey fee simple title to the Well Site lot to the Board of Water.
- 2.5 <u>Easements</u>. The Applicant shall convey the following perpetual grants of easements ("Easements") to the Board of Water:
- a. The Well Site Easement, which shall be a perpetual, exclusive easement for the Well Site;
- b. A perpetual, nonexclusive easement for the portions of the Transmission Line located on the Property;
- c. A perpetual, nonexclusive easement for the portions of the Electrical Transmission Facilities located on the Property; and
- d. Perpetual, nonexclusive easements for vehicular and pedestrian access to the Well Site, Transmission Line, and Electrical Transmission Facilities. Any access road to the Well Site shall be a gravel roadway.
- 2.6 <u>Well System</u>. The Well, Well Facilities, Transmission Line, Electrical Transmission Facilities, Well Site, and Easements shall be referred to collectively as the "Well System".
- 2.7 <u>Department Standards</u>. The Applicant shall construct the Well System in accordance with the Water System Standards and pursuant to construction and engineering plans approved by Department and prepared by an engineer licensed in Hawaii. Furthermore, the Well System shall be constructed in accordance with the standards of the State of Hawaii, Department of Health and Commission on Water Resource Management. The said constructed Well System shall have water quality equal or better than existing Department wells in the Wailua-Kapaa area.

2.8 <u>Final Subdivision Requirements</u>. Prior to final approval of the Subdivision by the Planning Commission, the Applicant shall: either complete the requirements contained in the Department's New Subdivision Report and receive a Certificate of Completion for required water improvements; or (in order to secure final approval prior to construction of the required water improvements) enter into a construction agreement and bond pursuant to the Department Rules, Part III, Section XII. If a bond is filed to secure final Subdivision approval, the Applicant shall clearly letter the following on the approved construction plans, final subdivision map and deeds:

"Domestic water service will not be available until the required construction improvements for this subdivision are completed and accepted by the Department of Water, County of Kauai."

The deed restriction shall be recorded with the Bureau of Conveyances within (90) days of final subdivision approval by the Planning Department. The Applicant shall complete any and all other Department subdivision conditions for the subdivision.

- 2.9 <u>Booster Pumps</u>. The Applicant shall be solely responsible for installing booster pumps, pressure tanks, backflow preventers and/or other related facilities for all water meters servicing dwelling units on the Property which are located at elevations such that the water pressure will be less than that required by Department standards. Each parcel with the potential for substandard water pressure as determined by the Department shall have an "Elevation Agreement" pursuant to the Department Rules, Part II, Section IV and Part III, Section IX. Lot owners shall complete an "Elevation Agreement" with the Department of Water, County of Kauai. The agreement shall be completed prior to building permit or water meter approvals. A deed restriction describing the elevation agreement condition shall be recorded with the Bureau of Conveyances within (90) days final subdivision approval by the Planning Department and clearly lettered on the final subdivision map.
- 2.10 <u>Water Master Plan</u>. The Applicant has prepared and submitted to the Department a final Water Master Plan dated May 2009 (Revised June 2012) that describes all of the water facilities required for the subject Subdivision and Residential Project. The Department agrees to accept this Water Master Plan (as revised) as complying with the Department's requirements for final subdivision approval.

2.11 Storage.

a. The Department will allow the Applicant will pay its pro-rata share of the costs of constructing ("Construction Costs") any water tanks owned by the Department ("Department Tanks") which are used by the Applicant to meet the water storage requirements for ("Water Storage Requirements") Phase I, Phase II and/or the Residential Project. Such Construction Costs shall include any and all costs reasonably incurred by the Department in constructing such Department Tanks, including but not limited to: engineering, architectural,

legal and other professional fees; site preparation; contractor's fees; labor and material costs; and any other associated fees and costs.

b. The Applicant will have the right to pay its pro-rata share of the Construction Costs for storage only if the Applicant participates in the construction of the Department Tanks as provided in this Agreement. If the Applicant does not pay the Construction Costs at the time the new Department Tank is being constructed (including the Ornellas Tank), then no storage in the new Department Tank will be allocated to enter Phase II (Lots 6-12) or the Residential Project. In such case, the Applicant's right to use the then existing storage (if any) available in the Department's public water system or any future storage will be subject to the standard rules and requirements of the Department.

3. SUBDIVISION/WATER METERS

- 3.1 <u>Department Subdivision Requirements</u>. The Department agrees to submit to the Planning Commission with regards to the Subdivision the Department's New Subdivision Report in the form attached hereto and incorporated herein as Exhibit "A", which contains the following requirements:
- a. The Applicant will pay the applicable Facility Reserve Charges ("FRC") (Transmission) for 8 additional meters for Lots 1-12. The parties understand and agree that there are already 4 meters at the Property.
 - b. The Applicant will construct or bond:
- (i) Main off-site Extensions along Olohena Road (8" diameter) to appropriate connection point.
 - (ii) Fire Service connections.
 - (iii) On-site water improvements.
 - (iv) Well System.
 - c. The Applicant and the Department will enter into this Agreement.
- d. The Applicant will pay for its pro-rata share of the Construction Costs for storage requirements for 7 meters in the Stable Tank.
- e. The Department will allow the Applicant to provide agricultural water needs for the Subdivision from the Department's water system based on the Goat Project. The Goat Project water needs are 10 gpd for each of the 356 goats for a total of 3,560 gpd.

- 3.2 <u>Phase I Water Meters</u>. The Department agrees to provide 12 additional water meters within Lots 1 through 5 (in addition to the 4 meters already on these lots) for the 16 farm dwelling units proposed thereon, together with all of their potable, agricultural and fire protection needs ("Phase I Water Service") subject to the following conditions:
- a. The Applicant pays the applicable FRC for the 12 additional water meters.
- b. The Applicant completes the Well System; the Applicant dedicates the Easements, Well Site, Well Facilities and Transmission Line to the Department; the Department accepts the dedication of the Easements, Well Site, Well Facilities and Transmission Line; and the Department has issued a Certificate of Completion for the Well System.
- c. The Applicant constructs the water improvements for the Subdivision as set forth in the Department's New Subdivision Report.
- d. The Applicant agrees that no water meters for Additional Dwelling Units ("ADUs") will be allowed.
- e. The Applicant agrees that there will be no water use on the 97 acre area that will be developed in Phase II unless the requirements set forth in Paragraphs 3.3 or 3.4 are fulfilled.
- f. The Applicant agrees that the County of Kauai ("County") shall not be required to approve or issue any water meters or building permits for dwelling units or other improvements in Phase I which require water service until Applicant fulfills the requirements of this Paragraph 3.2.
- g. The Applicant pays its pro-rata share of the Construction Costs of the Stable Tank to meet the Phase I Water Storage Requirements.
- h. To the extent that the Well Capacity is sufficient to meet the Phase I Water Service Requirements, the Applicant shall not be required to construct additional source facilities. If the Well System does not produce sufficient water for the Phase I Water Service Requirements, then Applicant agrees that it will be required to construct additional source facilities before the Department will be obligated to provide Phase I Water Service.
- 3.3 <u>Phase II Water Meters</u>. The Department agrees to provide 34 water meters within Lots 6 through 12 for the 34 farm dwelling units proposed thereon, together with all of their potable, agricultural and fire protection needs ("Phase II Water Service") subject to the following conditions:

- a. The Applicant has paid the FRCs in effect (at the time of payment) for 34 water meters.
- b. The Applicant completes the Well System; the Applicant dedicates the Easements, Well Site, Well Facilities and Transmission Line to the Department; the Department accepts the dedication of the Easements, Well Site, Well Facilities and Transmission Line; and the Department has issued a Certificate of Completion for the Well System.
- c. The Applicant has completed the construction of the water improvements for the Subdivision as set forth in the Department's New Subdivision Report.
- d. The Applicant agrees that no water meters for ADUs will be allowed.
- e. The Applicant has: paid the Applicant's pro-rata share of the Construction Costs for existing or new Department Tanks (including the Ornellas Tank) which may be necessary to meet the Phase II Water Storage Requirements, as determined by the Department; or has constructed such additional storage and related facilities as required by the Department. In either case, the Applicant shall not be entitled to Phase II Water Service until such storage facilities have been constructed and are in operation. Although the Applicant shall have the right to participate in the development of new Department Tanks (including the Ornellas Tank) as provided herein, the Department shall have the absolute discretion to determine when (if ever) and where to construct such new Department Tanks.
- f. Applicant agrees that the County shall not be required to approve or issue any water meters or building permits for dwelling units or other improvements in Phase II which require water service until Applicant fulfills the requirements of this paragraph.
- g. To the extent that the Well Capacity is sufficient to meet the Phase I and Phase II Water Service Requirements, the Applicant shall not be required to construct additional source facilities. If the Well System does not produce sufficient water for the Phase I and Phase II Water Service Requirements, then Applicant agrees that it will be required to construct additional source facilities before the Department will be obligated to provide Phase II Water Service.
- 3.4 <u>Water Service for Residential Project</u>. The Department will provide the Residential Project with all of its potable and fire protection needs ("Residential Water Service") subject to the following conditions:
- a. The Applicant has paid the FRCs in effect (at the time of payment) for the water meters for dwelling units for which Residential Water Service is being sought.
- b. The Applicant completes the Well System; the Applicant dedicates the Easements, Well Site, Well Facilities and Transmission Line to the Department; the

Department accepts the dedication of the Easements, Well Site, Well Facilities and Transmission Line; and the Department has issued a Certificate of Completion for the Well System.

- c. The Applicant has obtained the Land Use Approvals, subdivision approvals, and discretionary governmental permits (if any) necessary to develop the Residential Project ("Project Permits").
- d. The Applicant complies with any and all other Department requirements and conditions for the water facilities required by the Department for the Residential Project ("Project Water Facilities") which are necessary for the construction of the dwelling unit or facility for which Water Service is requested.
 - e. The Applicant constructs the necessary Project Water Facilities.
- f. The Water Service will be limited to not more than seven hundred sixty-nine (769) dwelling units, and water demand from other project developments such as parks, commercial, church, landscaping shall be deducted from this amount.
- g. If the Applicant has not obtained the Project Permits within five (5) years of the date of this Agreement, then the Department shall have no obligation to provide Residential Water Service as described herein.
- h. The Applicant has paid the Applicant's pro-rata share of the Construction Costs for existing or new Department Tanks (including the Ornellas Tank) which may be necessary to meet the Residential Water Storage Requirements, as determined by the Department, or has constructed such additional storage and related facilities as required by the Department. In either case, the Applicant shall not be entitled to Residential Water Service until such storage facilities have been constructed and are in operation. Although the Applicant shall have the right to participate in the development of new Department Tanks (including the Ornellas Tank) as provided herein, the Department shall have the absolute discretion to determine when (if ever) and where to construct such new Department Tanks.
- i. The Department agrees to allow the Residential Project to use all Phase II Water Storage capacity which the Applicant has paid for pursuant to Section 3.3.e.
- j. The Applicant agrees that the County shall not be required to approve or issue any building permits or water meters for dwelling units or other improvements in the Residential Project which require water service until Applicant fulfills the requirements of this Paragraph 3.3.
- k. The provisions of this Agreement shall not apply to any unbuilt dwelling units in the Residential Project unless building permit and zoning permit approvals for such dwelling units have been issued by the County within twenty (20) years of the date of this Agreement.

4. WELL SYSTEM CONTINGENCIES

4.1 <u>Well Capacity</u>. This Agreement is contingent on the proposed Well being capable of producing a minimum of five hundred (500) gallons per minute ("Well Capacity"). The Applicant shall have the duty of providing the Department with test results and technical data necessary to satisfy the Department that the Well will meet the Well Capacity. If the Department has not waived this contingency by approving the Well Capacity within two (2) years of the date of this Agreement, then either party shall have the right to cancel this Agreement by providing written notice of such cancellation to the other party.

4.2 <u>Well System Reservation</u>.

- a. The Applicant shall be entitled to receive the water from the Well System necessary to satisfy the Applicant's source requirements for Phase I (Lots 1-5), Phase II (Lots 6-12), and/or the Residential Project ("Source Reservation").
- b. The Department shall have the absolute right to use any water from the Well System in excess of the Source Reservation. In addition, the Department shall have the right to use on a temporary basis any water from the Well System that is not currently being used by the Applicant to satisfy its then current needs for Phase I, Phase II, and/or the Residential Project.
- c. The Source Reservation shall end twenty (20) years after the dedication of the Well System to the Department. Thereafter, the Department shall be entitled to use all water from the Well System other than that already allocated to water meters that have been issued to Phase I (Lots 1-5), Phase II (Lots 6-12), and/or the Residential Project.

5. FRC OFFSET

The Applicant shall be eligible for an FRC Offset as allowed in the Department Rules, Part IV, Section VII, Paragraph 4, for the following:

- a. The source component of FRCs for Phase I and Phase II to the extent that the Phase I and Phase II source needs are met by the Well System or by other source facilities constructed by the Applicant.
- b. The storage component of FRCs for Phase I, Phase II and the Residential Project to the extent that Applicant has paid the Construction Costs of constructing the necessary storage facilities.

6. INDEMNIFICATION/RELEASE

- 6.1 <u>Indemnification</u>. The Applicant agrees to indemnify, defend, and hold the Department and the County harmless against all claims, suits and actions by whomsoever brought on account of injuries or damages to persons or property resulting from: the Department's and the County's approval of the Subdivision; or the terms of this Agreement (jointly referred to as the "Claim Events").
- 6.2 <u>Release Of Claims</u>. The Applicant hereby releases the Department and the County and the Department's and County's successors and assigns, from any and all liability, losses and damages arising out of or related to the Claim Events.
- 6.3 <u>Claim Exceptions</u>. The Applicant's indemnification under Paragraph 3 and release under Paragraph 4 (collectively, the "Claim Duties") shall be subject to the following restrictions and limitations:
- a. The Applicant shall have no Claim Duties for any injuries or damages caused by the intentional acts of the Department and the County or any person acting on behalf of the Department and the County, including but not limited to, the Department's and the County's agents, employees, officers, contractors or elected officials (collectively, the "Department/County Agents").
- b. In any case where the Claim Event arises out of the joint negligence of the Applicant or the Applicant's Agents ("Applicant Negligence") and the Department and the County or the Department/County Agents ("Department/County Negligence"), then, the Applicant shall only be responsible for its share of damages based on the relative degree of the Applicant's Negligence as compared to the Department/County Negligence.

7. MISCELLANEOUS

- 7.1 Consents and Approvals. No consent or approval required hereunder shall be unreasonably withheld, conditioned or delayed, and any consent or approval required hereunder shall be deemed to have been given if the party from whom such consent or approval has been requested in writing shall not have responded with a statement of specific objections to such request within fifteen (15) business days after receipt of such request.
- 7.2 <u>Partial Invalidity</u>. If any provision hereof or the application thereof to any person or circumstance shall to any extent be invalid or enforceable, the remaining provisions hereof, or the application of such provision to persons or circumstances other than those as to which it is invalid or unenforceable, shall not be affected thereby.

- 7.3 Governing Law. This Agreement shall be construed, interpreted and applied in accordance with the internal laws of the State of Hawaii without giving effect to doctrines relating to conflicts of laws.
- 7.4 Costs of Enforcement. In the event any party to this Agreement brings any suit or other proceeding with respect to the subject matter or enforcement of this Agreement, the prevailing party (as determined by the court, agency or other authority before which such suit or proceeding is commenced) shall, in addition to such other relief as may be awarded, be entitled to recover reasonable attorneys' fees, expenses and costs of investigation as actually incurred.
- 7.5 Authority. Each person signing this Agreement warrants and represents that he or she has authority to sign on behalf of himself or herself or of the entity he or she represents and that this Agreement has been validly authorized and constitutes a legally binding and enforceable obligation.
- 7.6 No Third Party Beneficiaries. No term or provision of this Agreement is intended to be, or shall it be, for the benefit of any person, firm, organization or corporation not a party hereto, and no such other person, firm, organization or corporation shall have any right or cause of action hereunder.
- 7.7 <u>Attachments/Schedules/Exhibits</u>. All attachments, schedules, exhibits and riders attached hereto and referred to herein are by this reference incorporated into this Agreement. If the provisions of any attachment, schedule, exhibit or rider to this Agreement are inconsistent with the provisions of this Agreement, the provisions of such attachment, schedule, exhibit or rider shall prevail.
- 7.8 <u>Interpretation of Terms</u>. As used in this Agreement, the masculine shall include the feminine and neuter, the singular shall include the plural and the plural shall include the singular, as the context may require. In any case where this Agreement is executed by more than one person as a party, the obligations hereunder shall be joint and several.
- 7.9 <u>Titles, Captions and Headings</u>. The titles, captions and headings of the articles, sections or subsections of this Agreement are for convenience only and shall not be considered or referred to in resolving questions of interpretation or construction.
- 7.10 <u>Modifications</u>. This Agreement may not be modified except by a written agreement signed by all parties.
- 7.11 <u>Binding on and Inuring to Benefit of Successors and Assigns</u>. This Agreement shall be binding upon, and shall inure to the benefit of the parties, and their respective successors and assigns.
- 7.12 <u>Notices</u>. All notices and other communications in connection with this Agreement shall be in writing and shall be deemed to have been received by a party (a) when

actually received in the case of hand delivery or delivery by internationally recognized courier service, or (b) three (3) business days after being sent by United States mail, and shall be delivered or sent to the address of the Applicant or the Department as set forth below (or to such other address as may be specified by the Applicant or the Department by notice to the other parties) as the case may be. Any refusal to accept delivery of a written notice delivered or mailed to the addresses set forth below shall be deemed to be receipt of such notice for the purposes of this Agreement.

Applicant:

Allen Family, LLC

Moloa'a Bay Ventures, LLC The Three Stooges LLC c/o Mr. Greg Allen, Jr. 161 Wailua Road

Kapaa, Kauai, Hawaii 96746

with a copy to:

Max W. J. Graham, Jr., Esq.

Belles Graham Proudfoot Wilson & Chun, LLP

4334 Rice Street, Suite 202 Lihue, Kauai, Hawaii 96766

Department:

Department of Water

P. O. Box 1706

Lihue, Kauai, Hawaii 96766

Attention: Mr. David Craddick, P.E. Manager & Chief Engineer

with a copy to:

County of Kauai

Office of the County Attorney

Mo'ikeha Building

4444 Rice Street, Suite 220 Lihue, Kauai, Hawaii 96766 Attention: Alfred Castillo, Esq. County Attorney

- 7.13 <u>Counterparts</u>. This Agreement may be executed simultaneously in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Signature pages from separate signed copies may be attached to a single copy for purposes of recording.
- 7.14 <u>Terms.</u> All defined terms (such as "Applicant", "Water Board", "Department", "party", etc.), as and when used herein, or any pronouns used in place thereof, shall mean and include the masculine or feminine, the singular or plural number, individuals or corporation and their and each of their respective successors, heirs, personal representatives and assigns, according to the context thereof.

| agreements, restrictions, limitations or other interpreted or construed as unlawful, void perpetuities, then and in such case such cove | tuities. If any of the covenants, conditions, provisions of this Agreement shall at any time be or unenforceable for violation of the rule against enant, condition, agreement, restriction, limitation or to continue only until the ninetieth (90 th) anniversary |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | ne Applicant and the Department have entered into day of, 20 |
| | APPLICANT: |
| | ALLEN FAMILY, LLC, an Arizona limited liability company |
| | By |
| | Its |

| STATE OF HAWAII |) | | |
|------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| COUNTY OF KAUAI |) SS:) | | |
| sworn or affirmed, did say WATER AGREEMENT date page(s), as the free a | that such person exected and deed of such | , 20, before me appear personally known, who, being by me decuted the foregoing KAPAA HIGHLAN, 20, which document consists the person, and if applicable, in the capacith instrument in such capacity. | uly DS s of |
| | | e of Notary: ry Public, Fifth Judicial Circuit, of Hawaii. | |

APPLICANT:

MOLOA'A BAY VENTURES, LLC, a Hawaii limited liability company Its On this ______ day of ______, 20____, before me appeared ______, to me personally known, who, being by me duly sworn or affirmed, did say that such person executed the foregoing KAPAA HIGHLANDS WATER AGREEMENT dated _______, 20_____, which document consists of ______ page(s), as the free act and deed of such person, and if applicable, in the capacity shown, having been duly authorized to execute such instrument in such capacity. Name of Notary:

Notary Public, Fifth Judicial Circuit,

My commission expires:

State of Hawaii.

STATE OF HAWAII

COUNTY OF KAUAI

APPLICANT:

THE THREE STOOGES LLC, a Hawaii limited liability company

| | Ву |
|--------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| | Its |
| | |
| | |
| STATE OF HAWAII)) S | g. |
| COUNTY OF KAUAI) | 3. |
| sworn or affirmed, did say that WATER AGREEMENT dated page(s), as the free act | day of |
| | Name of Notary: Notary Public, Fifth Judicial Circuit, State of Hawaii. |
| | My commission expires: |

| | DEPARTMENT: |
|--------------------------------------|----------------------------------------|
| | DEPARTMENTOF WATER, COUNTY OF KAUAI |
| | By |
| | Its Manager and Chief Engineer |
| | |
| | |
| APPROVED AS TO FORM AND LEGALITY: | |
| | |
| County Attorney, County of Kauai | |

| STATE OF HAW | , | SS. | | | | |
|---------------------------------------|--------------------------------|-------------------|-------------------------------------------------------|-------------------------------------|--------------------------------------|-----------------------------|
| COUNTY OF KA | , | ss. | | | | |
| On say that he is the | this | day of, to me per | rsonally known, | , 20 who, being | _, before me by me duly | e appeared sworn, did |
| OF KAUAI, ar AGREEMENT page(s), o | nd that he dated n behalf of s | executed the | foregoing K , 20, of authority of | APAA HI which do f said Depar | GHLANDS cument co tment, and s | WATER nsists of aid officer |
| acknowledged sai Department has no | | | act and deed | of said Dep | eartment, and | I that said |
| | | | | | | |
| | | N | ame of Notary: otary Public, Fi tate of Hawaii. | fth Judicial | Circuit, | |
| | | N | ly commission of | expires: | | |

EXHIBIT "A"

REVISED SUBDIVISION REPORT

TO: PLANNING DEPARTMENT FROM: DEPARTMENT OF WATER **REVISED** TMK: 4-3-03:001 NAME: SILAGI FAMILY TRUST SURVEYOR: R. Wagner REPORT NO. S-99-45 1. Domestic water is adequate. Tentative approval is recommended. X 2. All requirements have been fully met and, therefore, Final Approval is recommended. 3. Before final approval can be recommended, the subdivider must: A. Pay the Department of Water the applicable Facility Reserve Charges ("FRC") for X 12 meters (for Lots 1-12). B. Prepare and receive Department of Water's approval of construction drawings for the X necessary water system facilities and either construct said facilities or post a performance bond for construction. These facilities shall also include: 1) Main extensions along Olohena Road, west of Kaapuni/Olohena Road intersection shall be a minimum of 8-inches in diameter. Main extensions shall be connected to appropriate connection points. 2) The fire service connections. 3) The Well System as described in the Kapaa Highlands Water Agreement. C. Prepare and convey to the Department of Water a right-of-entry and temporary grant of X easement for the purpose of construction, repair, maintenance, and operation of the subdivision water system improvements installed in other than County-owned property, if applicable. D. If a bond is filed, to secure final subdivision approval, the subdivider shall clearly letter X the following on the approved construction plans, final subdivision map, and deeds: "Domestic water service will not be available until the required construction improvements for this subdivision are completed and accepted by the Department of Water, County of Kauai." This deed restriction shall be recorded with the Bureau of Conveyances within ninety (90) days of final subdivision approval by the Planning Department. Other (or remarks): 4. X For lots with service connections below 40 psi (minimum of 35 psi), lot owners shall A. complete an "Elevation Agreement" with the Department of Water, County of Kauai.

This shall be done prior to any building permit or water meter approvals. This deed restriction shall be recorded with the Bureau of Conveyances within ninety (90) days of

final subdivision approval by the Planning Department. The affected lots shall be clearly identified on the approved construction drawings and final subdivision map.

- B. Lots 13, 16, 17, and Lot 18 are for roadway purposes and will not require water service from the Department of Water, County of Kauai (DOW).
- Lot 14 is for AC Walk purposes for the Kapaa Middle School and will not require water service from the DOW.
- D. The Subdivider shall execute that certain Kapaa Highlands Water Agreement ("Water Agreement") between the Subdivider and the Department of Water, County of Kauai, and submit an executed original to the Department of Water prior to final subdivision approval by the Planning Commission. The Water Agreement shall be recorded in the Bureau of Conveyances, State of Hawaii, within forty-five (45) days of final subdivision approval.
- E. Prior to installation of the eleven (11) additional water meters on Lots 1-5, the Applicant shall:
 - 1) Dedicate the Well System to the Department.
 - 2) Prepare and receive Department of Water's approval of construction drawings for the necessary source facilities (if additional source is required) and either construct said facilities or post a performance bond for construction.
 - 3) Pay its pro-rata share of the Construction Costs of the Department's Stable Tank to meet the Phase I (Lots 1-5) Water Storage Requirements, as determined by the Department
- F. Prior to installation of the thirty-four (34) water meters on Lots 6-12, the Applicant shall:
 - 1) Dedicate the Well System to the Department.
 - 2) Prepare and receive Department of Water's approval of construction drawings for the necessary source facilities (if additional source is required) and either construct said facilities or post a performance bond for construction.
 - Pay its pro-rata share of the Construction Costs for new Department Tanks (including the Ornellas Tank) which may be necessary to meet the Phase II (Lots 6-12) Water Storage Requirements, as determined by the Department. The Applicant shall not be entitled to Phase II Water Service until such storage facilities have been constructed and are in operation. Although the Applicant shall have the right to participate in the development of new Department Tanks as provided herein, the Department shall have the absolute discretion to determine when (if ever) and where to construct such new Department Tanks.
 - 4) As an alternative to Paragraph F.2), the Applicant shall prepare and receive Department of Water's approval of construction drawings for the necessary water storage facilities and construct said facilities.

TMK: 4-3-03:001 NAME: <u>SILAGI FAMILY TRUST</u> SURVEYOR: <u>R. Wagner</u> REPORT NO. <u>S-99-45</u>

| G. | The Department will allow the Applicant to provide for the agricultural needs of the Subdivision from the Department's water system based on the Applicant's Goat Project (which shall be limited to 3,560 gpd). | | | | | | |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------|-------|--|--|--|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | REVISED SUBDIVISION REPORT NO | 99-45 | | | |
| Gregg Fujikaw Chief of Water | a Resources and Planning | Date | | | | | |

SUMMARY OF KAPAA HIGHLANDS WATER AGREEMENT

A. FINAL SUBDIVISION APPROVAL REQUIREMENTS.

- 1. The Applicant will pay applicable Facility Reserve Charges ("FRC") for eight (8) additional meters for Lots 1-12. [NOTE: There are already 4 meters at the Property.]
- 2. The Applicant will construct or bond:
 - a. Main off-site Extensions along Olohena Road (8" diameter) to appropriate connection point.
 - b. Fire Service connections.
 - c. On-site water improvements.
 - d. Well System.
- 3. The Applicant and the Department of Water ("DOW") will enter into the Kapaa Highlands Water Agreement ("Water Agreement").
- 4. The Applicant will pay for its pro-rata share of the Construction Costs for storage requirements for 7 meters in the DOW's Stable Tank.
- 5. DOW will allow the Applicant to provide agricultural water needs for the Subdivision from the DOW system based on the Goat Project. The Goat Project water needs are 10 gpd for each of the 356 goats for a total of 3,560 gpd.

B. ISSUANCE OF PHASE I ADDITIONAL METERS (LOTS 1-5).

- 1. The Applicant will need 12 additional meters to be installed. [NOTE: There are already 4 meters installed within Phase I (Lots 1-5).] The Applicant will pay applicable FRCs.
- The Applicant will complete the Well System and dedicate it to DOW.
- The Applicant will receive source from the Well System for Phase I (Lots 1-5).
- 4. If the Well System does not have sufficient capacity, then the Applicant will construct additional source.
- 5. The Applicant will pay its pro-rata share of the Construction Costs from the existing Stable Tank to meet the Phase I storage requirements for the 12 additional meters.

C. ISSUANCE OF PHASE II ADDITIONAL METERS (LOTS 6-12).

- 1. The Applicant will need 34 meters to be installed. The Applicant will pay applicable FRCs.
- The Applicant will complete the Well System and dedicate it to DOW.
- 3. The Applicant will receive source from the Well System for Phase II (Lots 6-12).
- If the Well System does not have sufficient capacity, then the Applicant will construct additional source.
- 5. The Applicant will have the right to pay its pro-rata share of the Construction Costs from the new Ornellas Tank, or any other new tank that DOW may construct ("New Department Tank") to meet the Phase II storage requirements for the 34 meters. The Ornellas Tank or New Department Tank must be completed before service will be provided.
- 6. Alternatively, the Applicant may choose to construct the required storage facilities for Phase II.

D. RESIDENTIAL PROJECT.

- 1. The Applicant will receive source from the Well System for the Residential Project. If the Well System does not have sufficient capacity, then the Applicant will construct additional source.
- 2. If the Applicant has paid its pro-rata share of the Construction Costs for the Ornellas Tank or New Department Tank (for the Phase II water storage requirements), then that storage may be used to meet the Residential Project storage requirements. If such pro-rata share of the Construction Costs has not been paid, then the Applicant will have the right to pay its pro-rata share of the Construction Costs from the Ornellas Tank or New Department Tank to meet the Residential Project storage requirements. The Ornellas Tank or New Department Tank must be completed before service will be provided.
- 3. Alternatively, the Applicant may choose to construct its own storage facilities for the Residential Project.
- 4. The Applicant will construct all other water requirements imposed on the Residential Project.
- 5. The Applicant will have the right to pay for storage and to have storage in the Ornellas Tank or New Department Tank allocated to Phase II (Lots 6-12) or the Residential Project only if the Applicant participates in the construction of the Ornellas Tank or New Department Tank as provided in the Water Agreement. If the Applicant does not pay the Construction Costs at the time the Ornellas Tank or New Department Tank is being constructed, then no storage in the Ornellas Tank or New Department Tank will be allocated to either Phase II (Lots 6-12) or the Residential Project. In such case, the Applicant's right to use the existing

storage (if any) or any future storage available in the DOW's public water system will be subject to the standard rules and requirements of DOW.

E. SOURCE.

- 1. The Applicant shall be entitled to receive the water from the Well System to satisfy its source requirements for Phase I (Lots 1-5), Phase II (Lots 6-12), and/or the Residential Project ("Source Reservation").
- 2. DOW shall have the absolute right to use any water from the Well System in excess of the Source Reservation, and to use on a temporary basis any water not being used for the Phase I, Phase II, and/or Residential Project water service needs.
- The Source Reservation shall end twenty (20) years after the dedication of the Well System to DOW. Thereafter, DOW shall be entitled to use all water from the Well System other than that already allocated to water meters that have been issued to Phase I (Lots 1-5), Phase II (Lots 6-12), and/or the Residential Project.

BOARD OF WATER SUPPLY of the COUNTY OF KAUA'I

REGULAR MEETING

Second Floor, Microbiology Lab Bldg Kauasi County Department of Water 4398 Pua Loke Street, Lihuse, Kauasi, Hawaisi 96766

THURSDAY, July 28, 2011

10:00 a.m.

Or thereabouts

- A. CALL TO ORDER
- B. ROLL CALL
- C. ACCEPTANCE OF AGENDA
- D. MEETING MINUTES:

Regular Meeting Minutes – June 21, 2011

Recessed Regular Meeting Minutes – June 23, 2011

Special Board Meeting Minutes - June 30, 2011

Committee of the Whole Meeting – June 21, 2011

Recessed Committee of the Whole Meeting - June 23, 2011

Recessed Committee of the Whole Meeting – June 27, 2011

Finance Committee Meeting – June 23, 2011

Recessed Finance Committee Meeting – June 23, 2011

Recessed Finance Committee Meeting – June 27, 2011

Recessed Finance Committee Meeting – June 30, 2011

E. CORRESPONDENCE / ANNOUNCEMENTS

F. BOARD COMMITTEE REPORTS

- 1. Report of the Rules Committee of the Kaua'i County Board of Water Supply
 - a. <u>Manager's Report No. 11-24</u> Committee Discussion and Possible Action on Part III Rule Amendments Establishing Standards for Subdivision Water Systems.
 - i. Attached Proposed Draft Bill No. 2380
 - ii. Attached Proposed Draft Bill No. 2401
 - iii. Attached Approved Bill No. 2401, Draft

EXHIBIT "I-105"

NOTE: Special Accommodations for persons with disabilities are available upon request five (5) days prior to the meeting date. Please call the Department of Water, County of Kaua'i, at 245-5408 or drop by at 4398 Pua Loke Street, Līhu'e, Kauai. Our mailing address is P. O. Box 1706, Līhu'e, HI 96766

BOARD OF WATER SUPPLY **REGULAR MEETING**

July 28, 2011

F. BOARD COMMITTEE REPORTS - contd.

- 2. Report of the Finance Committee of the Kaua'i County Board of Water Supply
 - a. <u>Manager's Report No. 11-49-</u> R.W. Beck Report on Financial Planning Analysis and Water Rate Study
 - b. <u>Manager's Report No. 11-28</u> Request Board Approval of Facilities Reserve Charge Changes
- 3. Report of the Committee of the Whole of the Kaua'i County Board of Water Supply
 - a. Goals for the Manager

G. OLD BUSINESS

- 1. <u>Manager's Report No. 11-24</u> Committee Discussion and Possible Action on Part III Rule Amendments Establishing Standards for Subdivision Water Systems.
 - i. Attached Proposed Draft Bill No. 2380
 - ii. Attached Proposed Draft Bill No. 2401
 - iii. Attached Approved Bill No. 2401, Draft 2
 - iv. Revised DOW rule incorporating Bill No. 2401, Draft 2
- 2. <u>Manager's Report No. 11 -49 -</u> R.W. Beck Report on Financial Planning Analysis and Water Rate Study
- 3. <u>Manager's Report No. 11-28</u> Request Board Approval of Facilities Reserve Charge Changes i. Rule changes to implement FRC in Part Three and added section of the rules for FRC
- 4. Board Discussion on the 2011 Goals for the Manager
- 5. <u>Manager's Report No. 11 76 –</u> Memorandum of No. 2106 with the State Department of Transportation
 - a. Attached DOT MOU # 2106 date May 10, 2011

H. <u>NEW BUSINESS</u>

- 1. <u>Manager's Report No 12-1</u> Response to Attorney Belles Graham's correspondence in reference to Subdivision No. S-2009-12 The Koloa Early School and Honpa Hongwanji Mission of Hawaii
- 2. <u>Manager's Report No. 12 2-</u> Job No. PLH-39, Lihue Base yard Improvements Master Plan (Water Plan 2020 Project No. PLH 39) Lihue, Kauai. Request approval of finalized Master Plan

Page 2 of 5

BOARD OF WATER SUPPLY **REGULAR MEETING**

July 28, 2011

H. NEW BUSINESS – cont.

- a. Presentation of Master Plan for Job No. PLH 39 Lihue Base yard Improvements from Architects Hawaii
- 3. <u>Manager's Report No. 12 3-</u> First Contract Amendment for Job No. PLH-39, Lihue Base yard Improvements (Water Plan 2020 Project No. PLH 39) Lihue, Kauai
- Manager's Report No. 12-4- Requesting approval of funding change and Second Change Order for Job No. 03-02, Wainiha Booster Pump Station and Haena Steel Tank Renovations (Water Plan 2020 Project No. Phase 2, HW-02, HW-03)
- 5. <u>Manager's Report No. 12 5 -</u> Job No. 11 02, PLH 01a, Replace Grove Farm Tanks #1 and #2, Puhi-Lihue-Hanamaulu System, Kaua'i, Hawaii, award of contract to Esaki Surveying and Mapping, Inc.
- 6. <u>Manager's Report No.12 6 -</u> Third Change Order for Job No. 02 18, Kapaa Homesteads Pipeline Replacement, Phase 2 (Water Plan 2020 Project No. WK 32) Kapaa, Kauai
- 7. <u>Manager's Report No. 12–7</u> Fourth Change Order for Job No. 02 02, Piwai 677' 0.5 Million Gallon Storage Tank and Connecting Pipeline (Water Plan 2020 Project No. LO 04) Omao, Kauai
- 8. Manager's Report No. 12 8 Request approval for Revised Fiscal Division
- 9. <u>Manager's Report No. 12-9</u> Requesting approval of rule change to delete leak rebates a. PowerPoint Presentation on how a Private Insurance Company would provide the services that are required.
- 10. <u>Manager's Report No. 12 10</u> Response to Greg Allen correspondence in reference to Kapaa Highland.

I. <u>STAFF REPORTS</u>

MONTHLY- For the Month of July

- 1. Statement of Kaua'i County Water Department's Revenues and Expenditures
- 2. Report by the Public Relations Specialist on Public Relations Activities
- 3. Deputy Manager's Summary Report on Monthly Operational Maintenance
- 4. Manager's Monthly Update Regarding Activities of Note of the Kaua'i County Water Department

QUARTERLY:

- 1. Project Status Update
- 2. Affordable Housing Projects

Page 3 of 5

REGULAR MEETING MINUTES - DRAFT BOARD OF WATER SUPPLY Tuesday, June 21, 2011

The Board of Water, County of Kaua'i, met in regular meeting at its office in Līhu'e on Tuesday, June 21, 2011. Chairperson Roy Oyama called the meeting to order at 10:55 a.m. On roll call, the following answered present:

BOARD: Mr. Roy Oyama, Chairperson

Mr. Randall Nishimura Mr. Clyde Nakaya Mr. Daryl Kaneshiro Mr. Michael Dahilig Mr. Larry Dill

Absent and/or Excused: Mr. Raymond McCormick

STAFF: Mr. David Craddick

Mr. William Eddy Ms. Marites Yano Mr. Gregg Fujikawa Mr. Dustin Moises Mr. Keith Aoki Ms. Joy Buccat

Deputy County Attorney Andrea Suzuki

<u>GUESTS:</u> Mr. Clyde Kodani, Kodani & Associates

Mr. David Hinazumi, Grove Farm

Mr. Galen Gokan, Kodani & Associates

Mr. Mike Tressler, Grove Farm

Mr. Tom Nance, Tom Nance Water Resources

Ms. Shawn Shimabukuro, Grove Farm

Mr. Jan TenBruggencate - on behalf of The Limtiaco Company

Mr. Thomas Hazelton

Quorum was achieved with all members present.

AGENDA:

Chair Oyama noted it was requested to have Item H-5 Manager's Report 11-80 Staff response to Thomas Hazelton's Letter come before item E. Correspondence As there were no objections, Mr. Nishimura moved to approve the agenda as amended; seconded by Mr. Dill; by a unanimous vote, motion was carried.

MINUTES:

Regular Meeting – May 26, 2011

Mr. Nishimura requested to have staff include all items distributed during the board meeting including handouts, to be on the diskette when circulated. Manager Craddick stated to delete an error in the minutes on page 7 of 15 fourth paragraph down, "and disinfect it." With no opposition to this motion, Chair Oyama stated to amend the minutes with the additional information. With this exception to the acceptance of the minutes, Mr. Dahilig moved to approve the May 26, 2011 Regular Meeting Minutes as circulated, seconded by Mr. Kaneshiro; by a unanimous vote, motion was carried.

CORRESPONDENCE

Re: Letter from attorney for Subdivision No. S-2009-12

Mr. Nishimura moved to receive the letter and refer it to Staff, seconded by Mr. Kaneshiro; by a unanimous vote, motion was carried.

Re: Letter from Greg Allen

Mr. Nishimura moved to receive the letter dated May 11, 2011 from Greg Allen and refer it to the staff and Manager Craddick for recommendation, seconded by Mr. Kaneshiro; by a unanimous vote, motion was carried.

Re: Letter from Grove Farm regarding Lihue-Hanamaulu Water Master Plan

Ms. Shawn Shimabukuro of Grove Farm passed out a report to the Board Members and Staff of The Department of Water. On behalf of Grove Farm, Mr. Tressler requested to present a power point presentation of the Lihue-Hanamaulu Water Master Plan. Deputy County Attorney Andrea Suzuki expressed concerns on Grove Farm's power point presentation. As the agenda stated, a correspondence dated June 14, 2011 was requesting to address the Board of the Dual System Water Standards for the Lihue-Hanamaulu Master Plan. She requested to properly agenda the PowerPoint presentation in the future board meeting in order to adhere to the Sunshine Law. This will allow the public to have the advanced notice to attend this Grove Farm presentation of the Master Plan. A testimony can be provided, but a presentation cannot. Mr. Nishimura requested to receive report handed out to the Staff and Board Members by Mr. Tressler of Grove Farm. Mr. Dahilig also requested to defer presentation to the next meeting when it is on the agenda. Mr. Tressler explained the purpose of this presentation is that it follows the report to understand the concept and methodology of what is being done. Manager Craddick stated that the supplementary data given was received on Friday, June 17, 2011 and the Report for the presentation was given to the Staff and Board today, June 21, 2011. These materials will then be reviewed by the Board Members and Staff so that a report can be given at the next board meeting. Mr. Nishimura requested to allow the presentation because of the nature of this ongoing request by Grove Farm. Only two of the seven Board Members are educated of this request and this presentation will give the other Board Members an opportunity to find out what the issues are, what questions will come up, and where we can go from there. Mr. Kaneshiro requested for Mr. Tressler to give an overall presentation without the powerpoint.

Assigned to: _____

Eddic GF/DC, 5-23-2011

To: Dave Craddick
Kauai, Department of Water
To: Roy Oyama
Chairman of the Water board
May 11, 2011
4398 Pua Loke 96766

DEPT OF WATER

MAY 19 P2:12

DEPT. OF WATER COUNTY OF KAUA'

May 11, 2011 further clarification to the Modification and addendum of the 11-29-10 Proposal regarding water for the DOW and Kapaa Highlands.

The land was originally owned by Amfac . In 1999 it was sold to a Mr. Salagi who initiated a development project called "Kauai Highlands" and obtained DOW approval for 45 water meters.

In 2001 the project was sold to its second developer, Kapaa 160. They called it "Kulana Kai". The water approval was rescinded. Kapaa 160 defaulted on their mortgage in 2003.

The 3rd (current) developers are members of Allen Family LLC. They are the second position mortgage holders of the property. They formed The Three Stooges LLC, and have been calling the project "Kapaa Highlands" since taking it over in September of 2003.

Kapaa Highlands has had a tentative AG CPR subdivision approval for 12 AG lots, totaling 52 CPR units, since September of 2003.

The County Planning, Housing, and Administration Departments informed us that 97 acres of the Kapaa Highlands project site is identified in the general plan for development, and that affordable housing is needed on Kauai.

The County has encouraged Kapaa Highlands to develop a residential community.

The Kapaa Highlands project is now divided into 2 phases. The 1st phase as proposed is 5 Agricultural subdivision lots. This 1st phase is a 66 acre part of the overall project. The 66 acres are not identified in the County General Plan for urban development. They will remain an agricultural subdivision. Most of this portion of the project is already used for herding cattle sheep and goats. We also have recently helped Kapaa Solar to build Hawaii's largest solar farm on this part of the project.

The 2nd Phase is planned for 7 lots after we get an agreement in principal with the DOW for water and final planning approvals. Kapaa Highlands is currently seeking a zoning amendment on this 7 lot, 97 acre part of the project to create an urban addition to Kapaa Town of up to 800 residential units.

This is in line with the County General plan and the Kapaa Development plan.

Kapaa Highlands needs DOW approval, since we do not desire nor intend to do a private water system in the middle of the current DOW system, to get a final subdivision approval and to make possible the rezoning and development goals of the County General plan.

Kapaa Highlands has drilled and proven a Test Well is capable of producing a minimum of 550 Gallons per minute of good water. (Refer to Kapaa highlands water master plan for details and engineering reports). We understand the well in its current form is not straight enough to meet DOW requirements and we propose to do another replacement well or wells to provide the 550 GPM. We believe the planning for peak and some portion out of service or 242 GPM on an average day basis exceeds our requirements for water.

The DOW has two water tanks, the Ornellas tank at 313', and the Stables tank at 214' elevation.

It is our understanding the DOW needs source water for these two tanks. We also understand the Ornellas tank upsizing has not yet gone to bid and is not yet funded.

Kapaa Highlands has excess source water however needs water storage for its project.

The Third revision of our Water Master Plan was turned in to the DOW June of 2010.

The Kapaa Highland proposal is that the DOW commit to providing Kapaa Highlands with water storage from its existing and developing storage infrastructure.

Kapaa Highlands will develop and provide source water at the same ratio of source cost to storage cost to the DOW in excess of its own needs to supplement the DOW 313' and 214' water service zones.

We think it is reasonable that some of the water from the 214' elevation "Stables" water tank be used for the part of the Kapaa Highlands project that is below the 115' TOPO line (see the attached map). We also understand the static water pressure at this elevation is a minimal 40 pounds per square inch and we are willing to accept an elevation agreement and install pneumatic tanks if Kapaa Highlands or its successors in interest decide to build two story units.

The attached map identifies which parts of the project require water from the 214' elevation tank, and which parts require water from the 313' elevation zone tank.

If The DOW approves our plans, we will successfully build out a production well (or wells if necessary) built to DOW and CWRM standards, at the existing test well site.

We will build a water transmission line built to DOW standards to connect with the DOW system at Olohena road.

Kapaa Highlands will dedicate the well and necessary easements to the DOW.

Kapaa Highlands will develop the well and complete the transmission line during the 1st phase of the project. The Well will deliver 550 GPM or more of DOH/EPA quality water to the DOW.

The DOW will provide water to the 1st phase of Kapaa Highlands upon our completion of the production well and transmission line infrastructure.

Kapaa Highlands expects DOW will provide water to the 2nd phase of the Kapaa Highlands project only for buildings at or below the 115' TOPO line, upon completion of the Kapaa Highlands well and transmission line infrastructure.

The DOW will provide water to all of the 2nd phase of the Kapaa Highlands project only after its planned addition to the 313' elevation Ornellas water tank is completed and in service. And we are willing to accept covenants that run with the land

Should Kapaa Highlands fail to deliver water and infrastructure to the DOW as stated above then this agreement and any sales based on this agreement will be null and void.

The DOW would then be under no obligation or liability to provide storage to Kapaa Highlands.

I don't see a downside for the DOW you will get the water you need.

Kapaa Highlands will pay FRC's and the residents will buy water from the DOW.

Greg Allen

808-645-4500/

gallen@harbormall.net

To: Dave Craddick
Kauai, Department of Water
To: Roy Oyama
Chairman of the Water board
April-22-2011 *
4398 Pua Loke 96766

Modification and addendum of the 11-29-10 Proposal regarding water for the DOW and Kapaa Highlands.

Aloha Gentleman,

Please approve or comment and respond to this letter and the attached proposal regarding well water for the DOW and water service for the Kapaa Highlands project, dated November 29, 2010.

In consideration of a phone conversation between myself, Greg Allen and Dave Craddick on 4-21-11, I am hereby modifying the attached proposal as follows.

Kapaa Highlands is willing to accept a conditional water approval that does not require the DOW to provide water to the Multi-Family units in phase 2 of the Kapaa Highlands project which require service from the Ornellas 313'elevation tank. The DOW will provide service to the Multi-Family units in phase 2 of the Kapaa Highlands project requiring service from the Ornellas 313'elevation tank when the new addition to the 313' elevation tank is complete and in service.

We would still ask for water service to the 5 AG/ CPR units in lot 3, which were previously approved. We will of course build the water source and delivery system as part of the first phase build out of the Kapaa Highlands project.

Thank you,

Greg Allen / 808-645-4500

gallen@harbormall.net

To: Dave Craddick Kauai, Department of Water 11-29-10 2:00 pm meeting with Greg Allen

Proposal Regarding Water for the DOW and Kapaa Highlands.

Kapaa Highlands requests that the DOW consider trading with Kapaa Highlands, its well water source in exchange for the future right to DOW water storage capacity.

More specifically Kapaa Highlands will give to the DOW up front its excess well supply for the right to purchase water reservoir storage in the form of facilities charges from DOW in the future.

The Kapaa Highland proposal is that the DOW commit to providing Kapaa Highlands with water storage from its existing and developing storage infrastructure.

Kapaa Highlands will develop and provide source water to the DOW in excess of its own needs to supplement the DOW 313' and 214' water service zones.

The Kapaa Highlands development will be connected to the County of Kauai, Department of Water system. Kapaa Highlands will pay to the DOW facility reserve charges and future residents will buy water from the DOW,

The DOW calculates that there is -150,927 gallons per day water storage capacity for the proposed Kapaa Highlands project at the 214' elevation.

The 313' elevation has an excess of 872,639 GPD pending completion of new infrastructure currently being developed.

These figures rely upon Kapaa Highlands providing source water to both the 214' and 313' elevations. We are willing to provide the water source up front and build it out during the first phase of the Kapaa highlands project.

The source water would be provided years before any of the conceptual second phase of the project would be built.

The current Kapaa Highlands water source as tested would provide the DOW with an excess of 166,000 gallons of water per day above and beyond the current and future proposed uses.

Thank you,

GREG ALLEN 808-645-4500





May 16, 2011



Mr. Greg Allen 161 Wailua Road Kapaa, HI 96746

Dear Mr. Allen:

Subject:

Water Master Plan (WMP) for the Kapa'a Highlands Project on TMK: 4-3-03:001

Water Meter Service Request or Water Service Inquiry

In regard to your letters dated November 29, 2010, April 22, 2011, and email dated April 27, 2011. At the present time, the Department of Water (DOW) cannot commit storage capacity for Kapa'a. Highlands Projects. It is not clear what you are requesting the DOW to do. DOW has two large water projects of 349 units and 198 units that have conditional Planning approval subject to providing source and storage. If we allow you to go forward without providing storage or offering storage to those projects first and your project to our knowledge does not have zoning puts DOW in a tenuous position. DOW would in effect be allowing your development to "water bank" storage capacity with storage not yet developed.

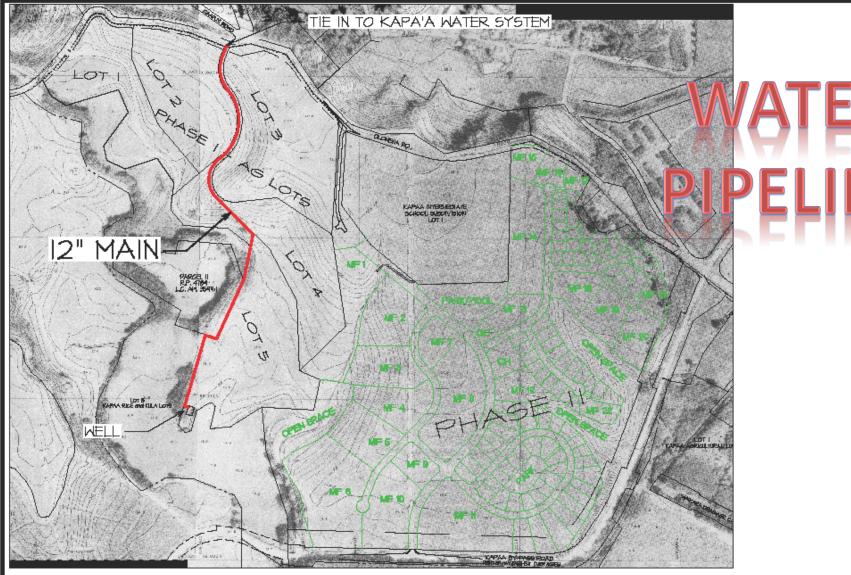
The DOW has future plans to construct additional storage tank(s) for the Kapa'a Homesteads 313' service zone; however, completion dates of these facilities are unknown at this time.

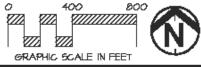
If you have any questions, please contact Mr. Edward Doi at (808) 245-5417.

Sincerely,

David R. Craddick, P. E. Manager and Chief Engineer

ED/GF/DC:loo T-12721 Kapa'a, Allen - Kapaa Highlands





KAPA'A HIGHLANDS PHASE I

WATER MAIN CONNECTION TO KAPA'A WATER SYSTEM

Witness Statement of Matt Rosener, P.E.

February 10, 2021

Q. Please state your name, place of residence, and describe any special skills or training pertinent to your testimony.

A. My name is Matt Rosener. I live part time in Port Angeles, Washington and also in Hanalei, Kaua'i. I am a professional engineer. My resume is attached as Exhibit I-108.

Q. Would the proposed redistricting of 96 acres of agricultural land to develop HoKua Place impact the preservation and maintenance of valued cultural resources and activities, and, historical, or natural resources, including water resource uses?

A. My review of the planned HoKua Place development that would follow the proposed DBA approval leads me to believe there would be substantial and significant impacts on the surface water and groundwater resources in the area surrounding this property.

The proposed potable water source-for-storage arrangement between the project developers and the Kaua'i Department of Water hinges on the assumption that one or more wells could be developed on the property to produce enough water to meet the development's projected demand for domestic and landscape irrigation uses. An exploratory borehole was drilled near the southwest corner of the property in 2006 to a depth of 260 feet below the ground elevation of 25 feet above sea level. To demonstrate the ability of the underlying aquifer to produce the required flow rates, the exploratory borehole was pump tested on October 19, 2006 by Tom Nance Water Resource Engineering. Correspondence between the Commission on Water Resources Management (CWRM), the well driller, and Mr. Nance described deficiencies in both the test well construction and the pump tests performed there, in regards to CWRM standards. Intervenor Exhibit I-119.

Mr. Nance stated in his report that, "During the course of drilling, two separate aquifers were encountered" and that "the strata between 80- and 210-foot depth are poorly permeable and function as an aquiclude separating the upper and lower aquifers." However, the idea of two distinct aquifers in this location conflicts with our general understanding of groundwater occurrence in the Lihue Basin. The southern Lihue Basin has been extensively studied by the US Geological Survey (USGS), and several publications from this research describe a vertically extensive freshwater lens in this area that extends continuously from well below sea level to near the ground surface (references needed?). These types of groundwater bodies are also termed "thickly saturated settings" in the recent USGS study report on low flow characteristics of streams on southeast Kauai (reference needed?). They occur in areas with wet climates that are underlain by extensive low-permeability lava

EXHIBIT "I-107"

flows such as the well-known late-stage Koloa Volcanics found throughout the Lihue Basin. While the USGS studies focused mainly on the southern Lihue Basin which is bounded on the northeast side by the Wailua River, the area of interest is less than two miles from there, and its geology and hydrogeology are very likely the same.

CWRM has noted that a video log from the test well showed several zones between the 95 and 200 foot depths where water was visibly flowing into the borehole, and the well driller's daily log entries confirm the presence of water-bearing formations within the 80 to 210 foot depth range that was deemed an aquiclude that separates distinct aquifer units. In a letter to the well driller dated January 5, 2009 requiring abandonment and permanent sealing of the test well, CWRM concluded that materials at the depths described by Mr. Nance "do not act as an aquiclude", stating that "these zones are not necessarily hydraulically separate from the lower-most water-bearing zone in the well bore (i.e. the bottom 40 feet) and not necessarily a different aquifer system." The USGS conceptual model for groundwater in the Lihue Basin supports the CWRM hydrologists' determination that there are not necessarily two discrete aquifers underlying the potential HoKua Place development area. As these two agencies serve as the foremost experts in the field of Hawai'i hydrogeology, I respect and concur with this determination, and my interpretation is that there is an unconfined, continuous, thickly saturated freshwater aquifer underlying the site that extends into and possibly through the low-permeability lavas of the Koloa Volcanics series.

In this thickly saturated setting, the USGS research in the southern Lihue Basin has shown a very strong connection between groundwater and surface water, with the aquifer providing substantial amounts of flow to seeps, springs, and the streams that have incised their way down to intersect the water table. By comparing estimates of groundwater recharge and stream baseflow in this area, USGS has determined more than 75% of the total recharge the basin receives, stating that, "the data indicate that most of the water recharging the southern Lihue Basin aquifer is eventually discharged subaerially to streams rather than directly to the ocean." Exh. I-54 (Izuka, S.K., et al, "A thick lens offresh groundwater in the southern Lihue Basin, Kauai, Hawaii, USA" 11 Hydrogeology J. 240 (2003)). In effect, what this means is that groundwater withdrawal in this area will result in corresponding reductions (of at least 64%) in streamflow in nearby stream channels and tributary springs. For the proposed development water demand values of 330,850 gpd (average) and 496,275 gpd (maximum), the predicted resulting reduction in flow in nearby surface waters is estimated to be at least 248,138 gpd during average demand days and 372,206 gpd during maximum demand periods. This seems significant because the approval of the proposed land use boundary change

would not only lead to a large land area designated as Prime Agricultural Land being permanently removed from possible food production, but it would also result in substantially less water available for agriculture in the surrounding area.

It should be noted that several springs have been recorded in the area of the proposed project, two of which are shown on the USGS topographic maps, and existing wells on neighboring properties are presently supplying irrigation water for agricultural production. These water sources would likely be impacted by the proposed well's cone of depression too, by reducing water levels and possibly yield. But I would expect the main impact to surrounding water resources to be on the flow of the nearby perennial stream and its riparian wetlands which currently serve to filter runoff from the sloping western portion of the proposed development site. This stream, which is unnamed on the USGS maps, has been called Kainahola Stream, Kaehulua Stream, and Hahanui Stream in various maps and documents over the years. The headwaters of this stream are near a high point called Kapukaiki in an area between the Makaleha Mountains and Moalepe - Kamoohoopulu Ridge, and the stream's drainage basin lies entirely within a wet climate zone with underlying, lowpermeability geology (Koloa Volcanics). This creates the elevated water table condition that allows for groundwater to constantly feed the stream's baseflow. Because of this, strong perennial flow exists in the stream near the proposed project area, even with a relatively small drainage basin. No doubt, this was a reason this area was historically used for taro farming, as evidenced by nearby kuleana parcels (Land Commission Awards 3599, 3971), and taro is still being grown nearby with water from the stream today.

The estimated reduction in streamflow of roughly 250,000 – 375,000 gpd from the proposed well pumping would reduce the potential for taro production by 1 – 3 acres based on average lo'i water use figures. For other types of agriculture, the Kaua'i Department of Water standards require an average irrigation supply of 2,500 gpd/acre, meaning that the estimated streamflow reduction could potentially reduce other agricultural production in this area by roughly 100 acres. A lot of food can be produced on 100 irrigated acres. Based on this analysis, the change from the State Land Use Agricultural District to State Land Use Urban District sought by the HoKua Place project developer would not only limit agricultural potential in this area through the loss of potential farm lands, but it

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¹ S. Gingerich, et. al, "Water Use in Wetland Kalo Cultivation in Hawai'i," U.S. Geological Surveey, Open File Report No. 2007-1157 (2007) (reviewing 19 lo'i complexes across Hawai'i and finding average inflow value is 260,000 gallons per acre per day, and the median inflow value is 150,000 gallons per acre per day).

would also substantially limit agricultural potential of neighboring properties in the Agriculture District.

In a CWRM memo dated September 18, 2008 on the borehole pump test results, staff noted a deficiency in the test performed as the reason they could not evaluate potential interferences with other wells in the area or potential stream impacts. Exhibit I-119 at PDF p. 130. Contrary to CWRM requirements, the water level in the test well was not allowed to fully recover between the step-drawdown test and the constant-rate test which is commonly used to estimate hydraulic properties of an aquifer system (e.g. hydraulic conductivity). The constant-rate test is often carried out over a period of several days, but in the case of this test, the constant-rate pumping period was only 10 hours at an average rate of 526 gpm (even though the well driller noted in his field notes that Mr. Nance had wanted to run the test for 48 hours). Of the 10-hour period of constant-rate pumping, CWRM staff used only the final 6 hours of data for their analysis of aquifer parameters. Note that Hawai'i Well Construction and Installation Standards specify a minimum test period for constant-rate tests of 48 hours for non-public water supply wells with a proposed capacity of 301 – 700 gpm and 96 hours for all public water supply wells. So, the pump test for this test well came up quite a bit short. CWRM staff noted the increasing drawdown trend near the end of the 10-hour constant-rate test period and indicated that this late-time data may be indicative of a long-term trend, but the test was not run long enough to show steady state conditions. Because of this, CWRM stated they were not able to assess the potential for interference with other area wells or impacts to streamflow. However, in earlier correspondence with the well driller (June 12, 2007), CWRM acknowledged there could be potential impacts to the adjacent stream and marshy/wetland areas as well as nearby wells, and they requested that future pumping tests include monitoring of the stream and wells for changes in levels and flows, but this was never done. After a long period of noncompliance by the well driller, eventually CWRM ordered the test well to be abandoned and sealed, but apparently this was also never done. To date, no proper analysis of the potential impacts of the proposed drinking water well on the stream, springs, wetlands, and nearby wells has been performed.

There is also the issue of the entire subject property being located on the makai side of the state's Underground Injection Control (UIC) line. Aquifers units on the makai side of this line are generally considered non-drinking water aquifers by the state Department of Health – Safe Drinking Water Branch. While there may be a variance process to construct a domestic water well makai of the UIC line, I would question whether this is a wise decision due to the property being located

entirely down-gradient of other lands designated for agricultural land use and a fair number of existing wastewater On-Site Disposal Systems (OSDS). These OSDS include an existing septic system on the nearby TMK (4) 4-3-004:011 and a large disposal system (~ 35,000 gpd) for the neighboring Kapaa middle school which is also located up-gradient of any proposed drinking water well site on the subject property. *See* Exh. I-67 (Invitation for bids on individual wastewater systems); Exh. I-119 at PDF 164. Because the underlying aquifer is an unconfined, thickly saturated groundwater body that may extend vertically to within a few meters of the ground surface, there is strong potential for subsurface pollutant transport to down-gradient surface water bodies such as the nearby springs and Hahanui Stream. This pollution potential also applies to other down-gradient wells used for drinking water and irrigation supply like CWRM-permitted Well Numbers 0419-04 and 0419-09 (Calvary Chapel Church, located just across the Bypass Road from the subject property).

Q. Is the proposed redistricting of 96 acres of agricultural land to develop HoKua Place consistent with the 2018 Kaua'i General Plan objective: "To preserve and protect our fresh and ocean waters and other water resources from wastewater and other pollutants"?

A. If the subject property is re-classed from the State Land Use Agriculture District to Urban District as proposed, substantial volumes of human sewage will be generated through the expected residential HoKua Place and HoKua Farm Lots developments. It appears the plan for sewage from the HoKua Place subdivision is to develop sewer infrastructure and route wastewater to the Wailua Wastewater Treatment Plant. There are questions about whether the plant has existing capacity to accept the projected wastewater flows from the proposed development, and an expansion would likely be needed. The 16 single-family residential lots proposed for the HoKua Farm Lots agricultural subdivision would presumably be served by Individual Wastewater Systems (IWS) rather than be connected to the sewer network. Because of the strong surface-groundwater connections in this area (previously described), these IWS should be designed to the NSF-245 standard for nitrogen-reducing aerobic treatment with supplemental disinfection units.

In addition to concerns about wastewater pollutants like fecal pathogens and nutrients moving through the subsurface to contaminate nearby surface- and groundwater bodies, other potential water pollutants sourced from the proposed residential developments would include fertilizers, pesticides, and herbicides used for landscaping operations. Given the thickly-saturated hydrogeologic setting, subsurface travel time of pollutants in groundwater may not be long enough for these pollutants to be neutralized before reaching down-gradient seeps, springs, wetlands, or the

Hananui Stream. The distance from the nearby segment of this perennial stream to the Pacific Ocean through the Waikaea Canal is only about one mile. Best Management Practices should always be used to minimize pollutant generation and transport, but even if utilized, the potential would remain for pollutant transport to sensitive receiving waters and environments like the nearshore coral reefs surrounding the Waikaea Canal's ocean outlet.

Q. Is the proposed redistricting of 96 acres of agricultural land to develop HoKua Place proposed for lands with satisfactory topography, drainage, and reasonably free from the danger of any flood, tsunami, unstable soil condition, and other adverse environmental effects?

A. Very little detailed drainage plan information is presented in the FEIS that could be used to evaluate potential impacts to surface runoff and drainage conditions in and around the property. The Preliminary Engineering Report Drainage Improvements - HoKua Place (FEIS Exhibit F) produced by Honua Engineering presents the most specific information on how drainage from the development would be managed and how surface runoff from the site would be contained to pre-development levels. This document describes existing drainage conditions on the property and provides a single paragraph on proposed drainage improvements that would be made as part of the HoKua Place project. A map in the 3-page report shows three detention basins located along the perimeter of the proposed development while the FEIS states that two detention basins and a combination of grass swales and drain lines would be used to control surface runoff, but the information included in the Preliminary Engineering Report and the FEIS is generally inadequate to evaluate the project's potential impact on drainage and flooding in the surrounding areas.

Based on my field experience in and around the nearby stream corridor, there are significant existing drainage blockage issues related to the lack of stream channel and riparian area maintenance by certain landowners along the stream. Exh. I-109 ("Hau Bush Impacts on the Hydrology of Kainahola Stream Near Bosshard Kuleana Property (TMK 4-3-0:11), Kapa'a, Hawai'i' May 28, 2018). These problems would be aggravated by any increase in runoff from the HoKua Place site that is directed towards the stream.

Q. Does this conclude your testimony?

A. Yes.

Matt Rosener, MS, PE

PO Box 4032, Port Angeles, WA 98363 (808) 639 2640 laminarmatt@gmail.com

Work Hydrologist/Water Resource Engineer (Owner) August 2006 – present Experience: North Shore Hydrological Services Port Angeles, Washington/Hanalei, Hawai'i

Currently leading watershed conservation and stream restoration programs for the Waipā Foundation that have improved stream water quality and increased populations of native aquatic species. Also currently performing hydrologic studies in support of streamflow restoration campaigns for East and West Maui, as well as East Kaua'i. Past projects include hydraulic studies for flood hazard mapping, hydrology/sediment transport studies to support streamflow restoration efforts, and development of real-time streamflow/water quality monitoring stations on Kaua'i. Client list includes the Waipā Foundation, the University of Hawai'i, the National Tropical Botanical Gardens, and Earthjustice, among others.

Hydrologist
US Geological Survey

Nov. 2006 – June 2011 Hanalei, Hawai'i

Served as the hydrologist on an interdisciplinary team performing research on fine sediment dynamics in tropical island watersheds. Responsible for installing, operating, and maintaining specialized equipment used to collect rainfall, runoff, and erosion data at Ridge-to-Reef research project sites at Hanalei, Kaua'i and Kawela, Moloka'i. Assisted with ground-based LiDAR surveys and geomorphic process mapping for study watersheds. Responsible for analyzing hydrologic data and providing support in preparation of technical papers and scientific journal articles. This was a part-time appointment with the Pacific Islands Water Science Center in Honolulu, HI and the Western Earth Surface Processes Team in Menlo Park, CA.

Hydrologist Hanalei Watershed Hui (NGO) Mar. 2005 – Mar. 2010 Hanalei, Hawai'i

Designed monitoring programs and analyzed hydrologic data in support of water quality and ecosystem restoration efforts, implemented water quality improvement projects within the local community, and worked as a member of a multi-agency, interdisciplinary team investigating erosion and sedimentation processes in the Hanalei River basin and Hanalei Bay. Facilitated replacement of several cesspools along the Hanalei River with alternative treatment systems.

Field Hydrologist/Researcher Research Corporation of the University of Hawai'i May 2006 – Dec. 2013 Hanalei, Hawai'i

Performed field research in the Waipā Stream and Hanalei River watersheds under the direction of Dr. Ali Fares, hydrology professor at the University of Hawai'i at Mānoa – Department of Natural Resources and Environmental Management. This National Weather Service-funded project focused on rainfall-runoff interactions, to evaluate

EXHIBIT "I-108"

suitability and potential of various hydrologic models for flash flood forecasting in Hawai'i. Worked as part of a research team including hydrologists and meteorologists from the National Weather Service, the University of Hawai'i at Mānoa, and the University of Hawai'i at Hilo. Operated and maintained a network of rain gages, weather stations, and throughfall (canopy interception) monitoring sites located throughout the Hanalei River basin.

Project Engineer Cardno ENTRIX

Apr. 2010 – Aug. 2011 Seattle, Washington

Led hydrology and assisted with hydraulics components of a large stream restoration and flood mitigation project at Punalu'u, O'ahu (Hawai'i), for Kamehameha Schools. Assisted in geomorphic assessment of Punalu'u Stream basin, field surveys, monitored stream levels, and made stream discharge and bedload measurements. Instructor for Pacific Islands Stream Restoration course in Hawai'i.

Design Engineer Wesley R. Segawa & Associates

Jan. 2002 – Dec. 2003 Hilo, Hawai'i

Performed hydrologic and hydraulic analyses and design for bridge replacements and renovations, flood control measures, and other drainage projects. Typically worked as part of an interdisciplinary team with other engineers, planners, geologists, and environmental scientists. For bridge and channel analysis, design, and floodplain mapping, the HEC-RAS river model was extensively utilized.

Civil Engineer USDA Natural Resources Conservation Service

Oct. 1999 – Oct. 2001 Astoria, Oregon

Provided the full range of engineering services for several stream-related conservation projects including flood and erosion control measures, culvert replacements, and fish habitat enhancements, all incorporating Large Wood elements. Worked closely with state and federal fisheries agencies to achieve multiple project objectives. Typical duties included surveying and mapping, geotechnical investigations, analysis and design, drafting, permitting, cost-estimating, construction inspection, and project management.

Education: Oregon State University

Skills:

Corvallis, Oregon
September 1997–December 1999
M.S. achieved December 1999
Major: Civil Engineering – Hydrology
Minor: Water Resources Planning &
Management

University of Minnesota Minneapolis, Minnesota March 1992 – June 1996 B.S. achieved June 1996 Major: Civil Engineering Emphasis in Water Resources

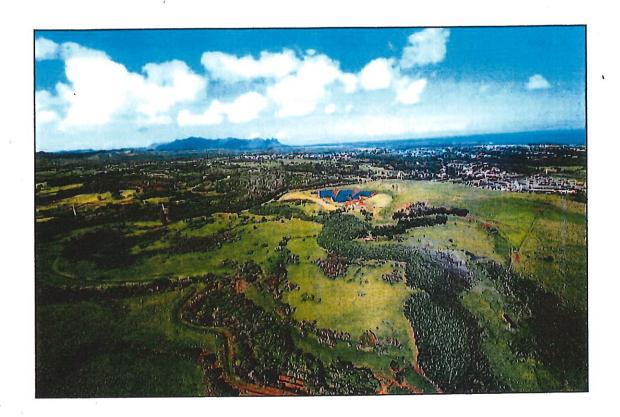
management

Certificates: Registered Professional Engineer (Civil), State of Hawai'i, 2003 (current)

Registered Professional Engineer, State of Washington, 2014 (current)

Proficiency with database programs, ArcGIS, AutoCAD drafting and mapping, topographic surveying, hydrologic/hydraulic analysis & modeling, flood hazard analysis, proposal- and report-writing, public speaking, community engagement.

HAU BUSH IMPACTS ON THE HYDROLOGY OF KAINAHOLA STREAM NEAR BOSSHARD KULEANA PROPERTY (TMK 4-3-04:11), KAPAA, HAWAII



PREPARED BY: MATT ROSENER, P.E., NORTH SHORE HYDROLOGICAL SERVICES

PREPARED FOR: KURT BOSSHARD, ESQ., OWNER OF TMK 4-4-3-4:11

SUBMITTED ON: 28 MAY 2018



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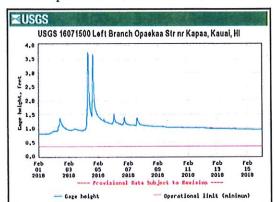
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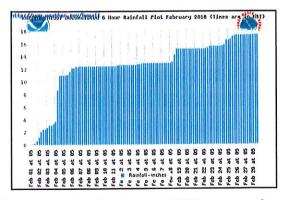
At the request of Kurt Bosshard, Esq., a series of reconnaisance-level field surveys was performed along Kainahola Stream between Olohena Road and the Kapaa Bypass Road during January-February 2018 to evaluate and assess the effects of vegetative overgrowth on streamflow conditions and the general hydrology of the surrounding area. Mr. Bosshard owns a Kuleana Lot (TMK 4-3-04:11) located partially within the floodplain of the Kainahola Stream upon which he operates a goat farm, and he also leases land on the adjacent property (TMK 4-3-03:01) where he operates a photovoltaic power plant and the aforementioned goat farm. Mr. Bosshard has an ongoing complaint against the State of Hawaii regarding the impacts that excessive Hau Bush (Hibiscus Tiliaceus) growth on neighboring State land are having on streamflow and drainage patterns through the Kainahola Stream corridorIn addition to the field surveys, I have performed research related to the hydrology of the Kainahola Stream drainage basin and historical land cover conditions in the project area, including change analysis of aerial photo and satellite imagery time series data. This brief report is intended to convey my interpretation of the physical and biological processes related to the dense Hau Bush thickets currently affecting hydrology and streamflow hydraulics in the Kaianahola Stream corridor (which includes the stream channel as well as all riparian and floodplain areas). A map of the subject area in included below for reference.



Site visits to the Kainahola Stream area were performed on 1/28/18 for reconnaisance and 2/15/18 for data collection, including measurements, pictures, and GPS coordinates at points of interest. During these two days, I was able to travel along much of the stream segment between Olohena Road and the Bosshard Kuleana Lot, often moving slowly through dense Hau Bush thickets. Downstream of the Kuleana Lot, the stream flows through a broad, grassy wetland area before reentering another Hau Bush patch just upstream of the culvert under the Kapaa Bypass Road. Within the Hau patch between Olohena Road and the Kuleana, I observed incredibly thick Hau Bush conditions that are clearly affecting the hydraulics of water flowing through this stream reach.

It should be noted that the weather pattern in the week prior to the 2/15/18 site visit had been on the dry side of ordinary, however there had been some heavy rainfall on Kauai earlier in the month, including 12" of cumulative rainfall at the nearest NWS rain gage station (Kapahi, HI50) during the first week of February. With small and steep watersheds, Kauai streams are typically very "flashy", and Kainahola Stream is no exception. A review of the streamflow





hydrograph for the closest USGS gage station (Left Branch Opaekaa Stream near Kapaa, 16071500) showed a quick rise in stage of three feet on the morning of 2/4/18 and a similar second peak later in the same day, but flow levels there had largely receded by 2/9/18. By 2/15, the day of the site visit, discharge at the gage station had receded to the range of winter baseflows, and it is highly probable that conditions in Kainahola Stream were likewise more indicative of baseflow rather than stormflow on the day of the

site visit. This allowed for observations near the lower end of the flow regime for Kainahola Stream which is important for understanding the issues of chronic flooding and high water table seen on the earlier reconnaisance trip.

On 2/15/18, starting just below the Olohena Road bridge, almost immediately I came upon several large Java Plum trees with their roots and stumps fully submerged by the stream in 1-3 feet of water. While this tree species can withstand prolonged flooding, it is considered extremely unlikely that these trees would have survived continuous flooding to reach their present age and size. Throughout much of the stream reach between Olohena Road and the Bypass Road, there is not a single, defined "main channel" of the stream but rather a braided pattern of several channels

alternating with broad backwater areas. The stream segment just below the Olohena Bridge,

however, is one of the few places where the entire stream is confined to a single channel passing under the bridge span. Just downstream of the bridge, a deep, defined channel continues for several hundred feet before widening and shallowing within the dense Hau Bush. The flooded Java Plum tree in the inset photo is located just at the edge of the deep water channel, hinting that it probably was growing above the



waterline, either on the streambank or at the top of the bank, at some point in the past. This was the first indication that conditions within the stream channel were somehow raising the water surface elevation in Kainahola Stream.

Following the channel downstream from the bridge, one doesn't have to go far to find evidence of the Hau Bush blocking the flow and backing up water. Throughout the dense Hau patch between Olohena Road and the Kuleana Lot, there are many places where the Hau has formed small "grade steps" in the longitudinal profile of the stream. Hau is a plant that will put roots down from any stem or branch that comes into contact with soil. Even cut or broken segments of Hau lying on the ground can take root within a few weeks. In places where Hau branches are growing horizontally near the ground surface or streambed, often roots become established and the branch acts as an obstacle that impounds water on a small scale, backing up water and creating a short grade step in the streambed profile. As the fibrous roots of the Hau branch become established, they grow into



a mat structure that is part organic matter and part mineral sediment trapped by the roots. Ultimately, the combination of the original Hau branch or log, along with accumulated root mats and sediment become the new streambed at an elevation slightly higher than the original

streambed. Over time, fine sediment and organic debris fills the streambed in the backwater behind the obstruction that acts like a settling basin. This process forms a step in the streambed and water surface profile, a feature that can be thought of as a grade step. Because the gradient of Kainahola

Stream through this reach is low ($\sim 0.5\%$), even small steps in the bed profile can cause a backwater effect that extends far upstream. For example, backwater from the 8" step in the inset photo might extend over 100 feet upstream at such a low gradient. The cummulative effect of a dozen or more grade steps within the Hau Bush corridor along Kainahola Stream are likely rasing the water surface profile by several feet. Another example of a Hau Bush-induced grade step just upstream of the Bypass Road culvert is shown below.



In addition to the elevation of the streambed described above, Hau Bush has other more obvious impacts on water levels in stream channels like Kainahola Stream. We know from basic open channel hydraulics that stream discharge (Q) is directly related to cross section area (A) and inversely related to a friction factor (n) through Manning's Equation (the hydraulic radius, R, and slope gradient, S, are also factors):

$$Q = (1/n) * A * R^{2/3} * S^{1/2}$$

The reduced cross section area of a Hau-tangled channel means that a higher stage is required to convey the same flow rate as an open channel without significant obstruction. And the increased friction on water flowing through the matrix of dense stems and branches also results in increased stage. These two physical effects on the flow tend to compound each other in the case of streams with significant obstruction like Kainahola Stream. While no hydraulic calculations were performed for this study (as no detailed topographic data is presently available to determine the required channel and floodplain geometry), there is no doubt that water levels in this stream reach would be noticeably lower without the Hau Bush overgrowth obstructing the flow.

This leads to the concept of the stream water surface elevation acting as the base level that affects hydrologic processes in surrounding areas. Stream channels generally serve as the drain for their watersheds, whereby water reaching the channel through surface or subsurface flow pathways is routed down the channel to a terminal outlet. For Kainahola Stream, this would be the Waikaea Canal, which drains into the ocean in Kapaa Town. In many cases, the water table in areas adjacent to a stream channel is higher in elevation than the water surface in the stream. This creates a hydraulic gradient (i.e. "head") which results in subsurface flow from the water table towards the



stream in a system that is called a "gaining" stream. (The opposite is called a "losing" stream where the channel loses water as it moves downstream to a water table that is lower than the streambed). The reach of Kainahola Stream between Olohena Road and the Kapaa Bypass Road appears to be a gaining system which is not surprising for the wet, east side of Kauai. So, groundwater movement is generally from the watershed towards the stream channel. This includes the area of the Bosshard Kuleana Lot, part of which is within the stream's active floodplain. As the water surface profile of the stream has risen in elevation over the years due to the processes previously described, the hydraulic gradient between the water table under the Kuleana Lot and the stream has decreased. The natural response to this change is a rise in the water table to restore the head necessary to drain groundwater to the stream channel. At this point in time, the water table has been elevated to near the ground surface in the lower parts of the Kuleana Lot, resulting in saturated soils that render the land useless for most activities. As the base level has risen, the water table has followed, but the ground elevation

hasn't changed. This is typically manifested in the lower section of the Kuleana Lot by higher frequencies of saturated soils, surface ponding, and flood events. The inset photo shows a portion of the Kuleana Lot with saturated soils and ponding due to the water table being at the ground surface even though there had been only ½" of rain in the week prior to the photo date (2/15/18). This area has historically been used for cattle grazing, but it is presently too wet for this land use because of the altered hydrology.

As the Hau Bush tangle in the Kainahola Stream corridor continues to thicken, the potential for a channel avulsion event increases. An avulsion is a stream channel drastically changing course,

abandoning a former channel and creating (i.e. eroding) a new channel. In this case, flood channels



currently pass water through the Kuleana Lot (see inset photo), but there is some risk that one of these could become the main stream channel since the grass and sedge vegetation offers much less resistance to water flow than the torturous Hau Bush. Usually, elevation differences between the lower stream channel and higher floodplain surface prevent this from occuring, but streambed aggradation in this reach of Kainahola Stream is bringing this scenario closer to reality. In this case, the friction exerted on flood flows by the dense

Hau Bush in the stream corridor dissipates much of the flow's kinetic energy, and the low slope gradient through this part of the valley limits the stream's potential energy. But the possibility exists for flow velocities high enough to produce shear stresses that cause substantial erosion if enough water escapes the Hau Bush into the adjacent grassed floodplain areas which could "unzipper" a new main channel through the Kuleana Lot. The inset photo shows a location where slow-flowing water exiting the



Hau Bush during a runoff event accelerates into an adjacent, grassy area.

Undersized or clogged drainage structures can contribute to or cause localized flooding, but in the case of Kainahola Stream, the only such structures in the study area were clear of debris during the 2/15/18 site visit. While the Olohena Road bridge area exhibited obstruction of the stream channel both upstream and downstream of the bridge, the channel under the bridge deck was open without visible debris blockage. A similar scenario was found at the Kapaa Bypass Road box culvert during the 2/15/18 site visit; the approach channel just upstream of the culvert was choked with Hau Bush (see inset photo), but the culvert structure was not clogged and looked to have



substantial capacity to convey flow under the Bypass Road. Given the conditions observed at these road crossings, it is deemed unlikely that the structures are causing or aggravating the chronic flooding problem in the project area. It should be noted, however, that if either of these two drainage structures become blocked with Hau Bush and/or other organic debris during a substantial

flood event in Kainahola Stream, the potential for adverse impacts to the study area would be high, ranging from increased flooding in upstream areas to catastrophic failure of roadways.

Other observations made during the field surveys along Kainahola Stream include the generally poor aquatic habitat conditions and expected poor water quality in the stagnant backwater ponds. While non-native Tilapia were seen in the stream in this area, this species is known to tolerate poor water quality conditions, and the physical habitat generally looked non-existent for native aquatic species like Oopu and Opae. These organisms generally prefer rocky substrate to the muddy streambed found in this stream reach, and Oopu feed primarily on algae which does not grow well in low-light environments like those found under the dense Hau canopy. Better habitat for these species may exist farther upstream in Kainahola Stream, but since they are diadromous (meaning they must spend part of their life cycles in both freshwater and ocean environments), native fish and prawns living upstream would have to pass through this extremely degraded reach of the stream to survive. No water quality measurements were made during the site visits, but based on the abundant signs of feral pig activity close to the stream and the startling amount of decaying organic matter in the streambed, very low dissolved oxygen and high fecal bacteria levels should be expected.

HISTORICAL ANALYSIS

Recognizing that the field surveys provided only a snapshot of current conditions in the Kainahola Stream corridor, an attempt was made to document changes in historical Hau Bush coverage through analysis of the aerial photo record. Based on field evidence described above, there are some strong indications that significant changes to the area's hydrology have occurred in the recent past and are continuing to occur now. Unfortunately, the dense Hau Bush jungle prohibits the simple acquisition of topographic data needed to perform detailed hydrologic study of the area. On the other hand, remote sensing methods and G.I.S. tools use readily-available data to provide information about landscape changes over time. A time series of aerial photos and satellite images was aquired for this anlaysis from a variety of sources, and all images were orthorectified and georeferenced (i.e. "lined up") before any comparisons were made². The older photos in the set, which date back to 1950-1951 for this area, generally had less quality or resolution than the more recent photos, but they are still helpful in understanding the history of vegetation and groundcover change for this site. The analysis presented here is limited to changes in the boundaries of the Hau Bush patch along Kainahola Stream over time, with average spread rates derived from their changing locations. Ideally, we would be able to map out changes in the stream channel itself over

¹ Geographic Information Systems software

² Due to the low quality of most of the images used, the accuracy of georeferencing and boundary determination is considered "fair to poor", and results should be considered preliminary until higher quality images can be used to verify or correct them.

time, but the incredibly dense nature of both the Hau Bush and grassy vegetation severely limits views of the channel network in every hisorical air photo.









Aerial photos of the subject area are shown above for the years 2000, 2010, and 2014, along with a satellite image from 2005. These images were chosen for analysis because they are from the most

recent time period available and they roughly represent 5-year intervals (2014 is the most recent image acquired). For each photo, the perimter of the Hau patch between Olohena Road and the Kuleana Lot was digitized by hand using visual cues, and the area of the resulting polygon shape was determined with G.I.S. The overall acreage of the same Hau Bush patch is shown on each of the photos, ranging from 8.7 acres in 2000 to 10.5 acres in 2014. This equates to an increase of 1.8 acres over a 14 year time span, or an average of 0.13 acres per year. However, there was clearly maintenance being performed on the patch's edges during this timeframe, particulary within the Kuleana Lot, so these rates of increase should not be considered spread rates for the Hau Bush. Instead, measurements were made for boundary segments that were assumed to have no maintenance during this period, and spread rates were calculated based on these. The photos used for this analysis included 2005 (for its superior resolution) and 2014 (for its recency). The photo below shows the Hau patch boundaries for these two photo years overlaid and dimensioned to show movement of the boundary over this period.



Comparison of georeferenced air photos from 2005 and 2014 confirms that the Hau Bush patch along Kainahola Stream spread substantially during this time period. Along the eastern boundary, the edge of the Hau Bush generally moved outward from the stream at 50 - 75 feet horizontally over approximately 9 years, yielding spread rates of 6 - 8 feet per year. Note that in the area of the Kuleana Lot, one segment of the Hau Bush boundary exhibits no change while another shows a

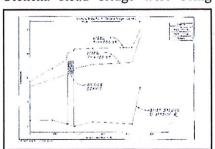
negative change of 40 -100 feet. These segments received maintenance treatments during the time period bounded by the two photos, which explains the deviation from the overall trend. The western boundary of this Hau patch also receives periodic maintenance along a fenceline so this edge has not changed significantly over the time period. Edge segments not being actively maintained can be expected to continue expanding outward at rates of 6 - 8 feet each year based on this analysis.

RECENT FLOOD EVENTS

Video footage captured from the Bosshard Kuleana Lot during two separate, recent flood events was reviewed for this study, including a moderate flood event on 2/4/18 and a much larger flood event on 4/15/18. From the footage of both events, it is evident that overbank flows through the Kuleana Lot move slowly across the floodplain in an energy state called "subcritical flow". Under these conditions, the flow is controlled from a downstream point, and disturbances to the flow are transmitted upstream. The relatively low slope gradient of the Kainahola Stream channel through the study area is the primary factor in this flow condition developing, and this is important because it allows downstream obstructions to create backwater effects in the water surface profile of the stream. In the case on Kainahola Stream, the most significant obstructions within the stream channel network and the floodplain are dense stands of Hau Bush that are definitely causing backwater and increasing water levels through the mechanisms described earlier.

During the 4/15/18 flood event, water overtopped the Olohena Road bridge to a depth of several

feet as evidenced by the inset photo. While the bridge was designed to overtop during a 500-year flood event, it has design capacity to convey the 100-year flood discharge without overtopping (Sato & Associates, 2001). The 4/15/18 flood was a significant climatic event on Kauai, but it was not a 500-year flood event in Kainahola Stream, and its return period was probably less than 100 years. This suggests that the flow hydraulics around the Olohena Road bridge were being significantly impacted by



channel obstruction at the time of the photo presented here, causing an increase in the water surface



elevation to a level similar to the predicted level for a 500year flood discharge at the bridge. While the exact cause of the flow obstruction is not known, the likely culprit is again Hau Bush and associated debris. Clogged stream channels

near drainage structures like the Olohena Road bridge can lead to very dangerous conditions during flood events. Catastrophic failure of bridges, culverts and/or road embankments due to water

impoundment in blocked channels can result in loss of life and subtantial property damage downstream.

SUMMARY

A combination of field observations and historical data research was used to document changes to landscape and hydrologic conditions in the Kainahola Stream corridor between Olohena Road and the Kapaa Bypass Road in Kapaa, Kauai, Even without the topographic data needed to perform detailed hydrologic and hydraulic studies of the area, the conditions observed during the field reconnaisance and surveys were suggestive of significant changes to the area's hydrologic processes over time. These changes appear to be primarily related to Hau Bush overgrowth in the Kainahola Stream channel and floodplain that essentially controls the stream channel geomorphology at this point in time. It appears that aggradation of the streambed through the process of Hau Bush forming grade steps in the stream profile has locally raised the base level which, in turn, has raised the surrounding water table to the point of saturation and ponding at the ground surface in floodplain areas within the subject Kuleana Lot. These processes, coupled with the obvious effects that dense Hau Bush has on stream water levels through its impact on channel cross section area and friction resistance, have resulted in significantly altered hydrology for this Kainahola Stream reach. This is expected to be manifested via increased frequency of soil saturation, ponded water, and flood frequency in low areas along the stream where the water table has risen to near the ground surface. Continued aggradation in the existing stream channel(s) related to Hau Bush overgrowth could lead to stream avulsion at some point in the future.

Analysis of aerial photos and satellite images shows that the Hau Bush boundaries along Kainahola Stream are, in fact, migrating away from the stream channel, indicating spreading of this extremely invasive species along Kainahola Stream. Spread rates are estimated to be 6 - 8 feet per year along Hau edges without maintenance, and the density of Hau within the patch permeter can also be expected to grow over time, which will likely continue to alter the hydrology of this already-degraded stream system and all surrounding, low-lying areas.

Field investigations confirmed that Kainahola Stream drainage structures at Olohena Road and the Kapaa Bypass Road were open and clear of debris, although upstream and downstream channel reaches were choked with Hau Bush and other aggressive vegetation. Blockage of these structures is not considered to be a primary factor in causing the chronic flooding problem discussed here, but the potential exists for this to further aggravate flooding in the future if stream channels near the structures are not maintained. Subcritical flow conditions throughout the study reach of Kainahola Stream allow dense Hau Bush thickets to backwater the stream and its floodplain, drastically altering the area's hydrology. Substantial maintenance is urgently needed to restore stream function and health in this degraded segment of Kainahola Stream.

REFERENCES

The following is a list of technical documents reviewed for this study:

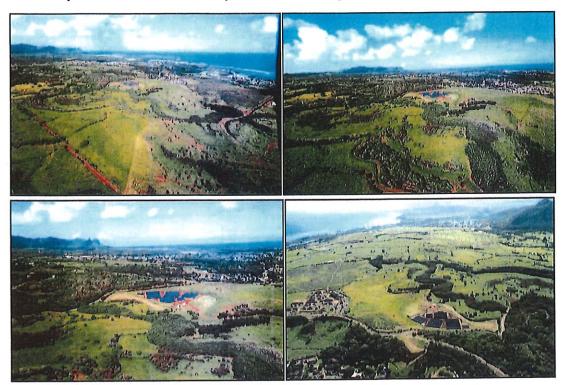
- 1. Drainage Report for the Olohena Bridge Replacement No. 1. Sato & Associates, Inc. Sept. 14, 2001.
- Drainage Report Kapaa Highlands Subdivision. Wagner Engineering Services, Inc. June 9, 2008.
- 3. Flood Review for Proposed Dwelling on Parcel 11 of TMK 4-3-04. Honua Engineering, Inc. March 2016.
- 4. Kaua'i Climate Change and Coastal Hazards Assessment. University of Hawai'i Sea Grant College Program. June 2014.
- 5. State of Hawaii Commission on Water Resources Management, Well Completion Report Part 1. State Well No. 2-0419-010. Kauai Water Well (Drilling Contractor). Aug. 5, 2015.
- 6. Flood Frequency Estimates for Streams on Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i. US Geological Survey Scientific Investigations Report 2010-5035. 2010.
- Hawaii StreamStats: A Web Applicationm for Defining Drainage Basin Characteristics and Estimating Peak-Streamflow Statistics. US Geological Survey Fact Sheet 2010-3052. 2010.
- 8. Low-Flow Characteristics of Streams . on the Islands of Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i. US Geological Survey Scientific Investigations Report 2016-5103. 2016.

The following is a list of court documents reviewed for this study:

- 1. First Amended Complaint for Relief, KRB, LLC vs. State of Hawaii et al. Dec. 1, 2015.
- 2. Motion for Summary Judgment. KRB, LLC vs. State of Hawaii et al. May 26, 2017.
- 3. Defendant's Memorandum. KRB, LLC vs. State of Hawaii et al. Jul. 3, 2017.
- 4. Reply on Plaintiff's Motion for Summary Judgment. KRB, LLC vs. State of Hawaii et al. Jul. 7, 2017.

REFERENCE PHOTOS AND VIDEOS

In addition to the orthorectified, georeferenced aerial photos that were evaluated by the change analysis described earlier, the following four oblique aerial photos were used for reference. The first three photos were taken in January 2011, and the last photo was taken in November 2015.

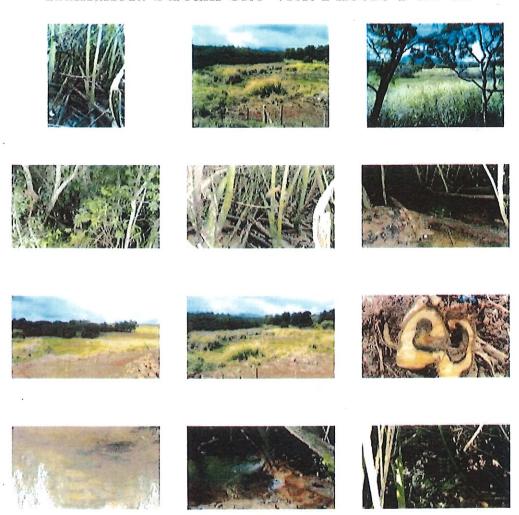


Several photos were taken with a GPS camera during both of the site visits to Kainahola Stream on 1/28/18 and 2/15/18. Some of these photos are included in this report; all of the photos are included in the Appendix. Other photos of the project area taken during high water conditions on 3/24/18 were provided by Mr. Bosshard. These were evaluated for the study and are included in the Appendix.

Video footage acquired during heavy runoff and flood events from 2/4/18 and 4/15/18 were also reviewed for this study. The footage was taken from a terrace above Kainahola Stream within the Bosshard Kuleana Lot, and it clearly shows drainage patterns through the pasture portion of the property during flood events.

Aerial video footage taken from a drone was also reviewed for the study. This was helpful for understanding the general lay of the land, the extent of Hau Bush coverage, surrounding land use and land cover conditions, as well as identifying significant landscape features of interest in the study area.

Kainahola Stream Site Visit Photos 1-28-18



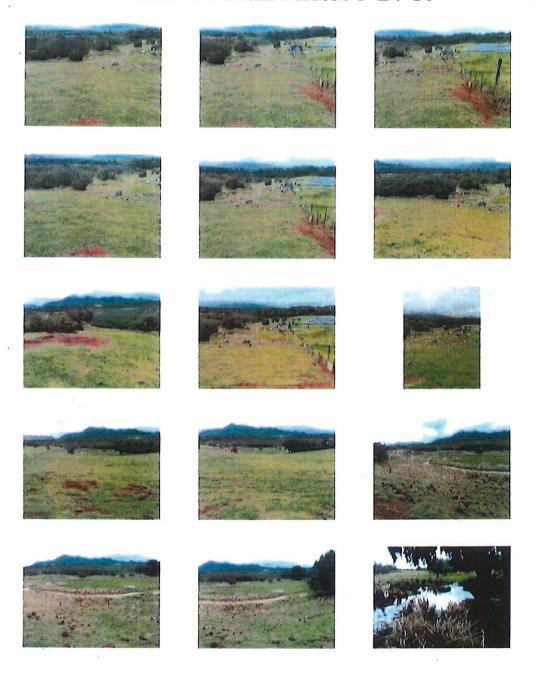
Kainahola Stream Site Visit Photos 2-15-18



Kainahola Stream Site Visit Photos 2-15-18



Kainahola Stream Photos 3-24-18



Kainahola Stream Photos 3-24-18



Peter T Young

From: elizabeth midwikis <emidwikis@sbcglobal.net>

Sent: Saturday, January 17, 2015 12:05 PM

To: luc@dbedt.hawaii.gov
Cc: info@hookuleana.com
Subject: hokua place plan for kauai

please do not change the land zoning from ag to urban for the development of hokua place in kauai / as a resident of kauai I have grave concerns about traffic, water and waste treatment, over filling the landfill, overfilled schools.....etc....

thank you for your consideration vance collins and elizabeth midwikis



United States Department of the Interior



FISH AND WILDLIFE SERVICE Pacific Islands Fish and Wildlife Office 300 Ala Monna Boulevard, Room 3-122 Honolulu, Hawaii 96850

JAN 1 6 208

In Reply Refer To 2015-TA-0102

Peter T. Young Hookuleana LLC 1539 Kanapuu Drive Kailua, Hawaii 96734

Subject: Technical Assistance for the Proposed HoKna Place Project, Kanai

Dear Mr. Young:

The U.S. Fish and Wildlife Service (Service) received your letter, dated December 17, 2014, requesting our comments on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed HoKna Place housing development on the Island of Ranai. HG Kauai Joint Venture, LLC proposes to develop a mix of 86 single-family and 683 milti-family units, affordable housing residential units, park and open space area, and commercial areas including associated infrastructure (transportation and water/wastewater improvements). The development will be located on approximately 97 acres of a larger 163 acre parcel (TMK 4-3-003-001) adjacent to Olohena Road in Kapaa. We offer the following comments to assist you in the preparation of the draft Environmental Impact Statement (EIS). Our comments are provided under the authorities of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C 1531 et seq.).

We reviewed the information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Program, as it pertains to federally listed species and designated critical habitat. The following species are known to occur or transit through the proposed project area: the endangered Hawaiian black-necked still (Himantopus mexicanus knudseni), Hawaiian moorben (Gallinula chloropus sandvicensis). Hawaiian coot (Fulica ulai), Hawaiian duck (Anas wywilliana) (hereafter collectively referred to as Hawaiian waterbirds); the endangered Hawaiian goose (Branta sandvicensis); the endangered Hawaiian hoary bat (Lasturus cinereus semotus); and the endangered Hawaiian petrel (Pterodroma sandwichunsis), the threatened Newell's shearwater (Puffims auricularis newelli), and a candidate for listing the band-rumped storm-petrel (Oceanodroma custro) (hereafter collectively referred to as seabirds). There is no designated critical habitat within the vicinity of the proposed project area. We provide the following recommendations to avoid and minimize project impacts to listed species and candidate species.

EXHIBIT "I-110"

Peter T. Young

Hawaiian Waterbieds

Our information suggests that your project may result in standing water or creation of open water, thus attracting Hawaiian waterbirds to the site. In particular, the Hawaiian stilt is known to nest in sub-optimal locations (e.g., any ponding water) if water is present. Hawaiian waterbirds attracted to sub-optimal habitat may suffer adverse impacts, such as predation and reduced reproductive success, and thus the project may create an attractive nuisance. Additional details on the proposed site preparation and grading activities is necessary to assess potential impacts to Hawaiian waterbirds. We suggest the draft EIS provide this additional information and outline measures to avoid and minimize potential impacts. Therefore, we recommend you work with our office during project planning so that we may assist you in developing measures to avoid and minimize impacts to Hawaiian waterbirds.

Hawanan Gooss

In order to avoid impacts to Hawaiian goese, we recommend a biologist familiar with the nesting behavior of the Hawaiian goose survey the area prior to the initiation of any work, or ofter any subsequent delay in work of three or more tays (during which birds may attempt nesting). If a nest is discovered, work should cease immediately and our office should be contacted for further goldance. Furthermore, all on-site project personnel should be apprised that Hawaiian goese may be in the vientity of the project at any time during the year. If a Hawaiian goose (or geese) appears within (10) feet of ongoing work, all activity should be temporarily assponded until the Hawaiian goose (or geese) leaves the area of its own accord.

Hawaiian Hoary Bat

The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed. Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.

The EISPN states that the project will adhere to the measure mitigation measure of not clearing woody vegetation greater than 15 feet between June 1 and September 15. The EISPN also describes an alternative mitigation measure of "reviewing areas" scheduled for removal with vegetation greater than 15 by a qualified land manager, biologist, or forester prior to removal, and notifying the Service if a bat is found in the trees scheduled for removal. The Service appreciates your efforts to minimize impacts to the bat. However, as currently written, we are concerned that the proposed alternative protocol is insufficient to assure impacts to the bat would be minimized. We are concerned with the effectiveness of reviewing areas to confirm that juvenile bats are not present in or near trees prior to or during clearing operations. To minimize impacts to the endangered Hawaiian-hoary bat, we recommend adherence to our guidance that woody plants greater than 15 feet tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15).

Peter T. Young 3

Seabirds

Seabirds, including the Newell's shearwater. Hawaiian petrel, and band-rumped storm petrel fly at night and are attracted to artificially-lighted areas resulting in disorientation and subsequent fallout due to exhaustion. Seabirds are also susceptible to collision with objects that protrude above the vegetation layer, such as utility lines, guy-wires, and communication towers. Additionally, once grounded, they are vulnerable to predators and are often struck by vehicles along roadways.

We understand the exterior lights installed in conjunction with the proposed project, including streetlights, will be shielded. To further reduce potential impacts to seabirds, we recommend the following minimization measures be incorporated into your project description:

- Construction activities should only occur during daylight hours. Any increase in the use
 of nighttime lighting, particularly during peak fallout period (September 15 through
 December 15), could result in additional seabird injury or mortality.
- If housing development lights cannot be eliminated due to safety or security concerns, then they should be positioned low to the ground, be motion-triggered, and be shielded and/or full cut-off. Effective light shields should be completely opaque, sufficiently large, and positioned so that the bulb is only visible from below.

The draft EIS should examine potential impacts to the Newell's shearwater, Hawaiian petrel, and band-rumped storm petrel that may occur as a result of construction and the operational use exterior lights associated with the proposed project.

Utility poles and overhead lines may constitute a collision hazard for scabirds as they traverse between the ocean and their breeding colonies. Additional information on the design of the proposed utility system for the development, including the number of utility poles, length of powerline, configuration of powerlines, and height of utility poles and overhead powerlines, in the area is necessary to assess the potential impacts to seabirds. We suggest the draft EIS provide this additional informational as well as determine whether undergrounding power lines in the proposed development area is feasible to avoid impacts to seabirds. If it is not feasible to underground power lines or install power lines at or the below the vegetation layer, other measures to minimize the potential for seabird collision should be analyzed in the draft EIS (e.g., vertical versus borizontal arrays, etc.).

If it is determined that the proposed project may affect federally listed species, we recommend you contact our office early in the planning process so that we may assist you with the ESA compliance. Additionally, we recommend you incorporate the attached best management practices into your project description to avoid and minimize impacts to water resources that have the potential to occur during water and wastewater system improvements.

Peter T. Young

We appreciate your efforts to conserve endangered species. Please contact Adam Griesemer, Endangered Species Biologist (phone: 808-285-8261, email: adam_griesemer@fws.gov) should you have any questions pertaining to this response

Sincerely,

Aaron Nadig

Island Team Manager

Oahu, Kanai, North Western Hawaiian

Islands, and American Samoa

U.S. Fish and Wildlife Service Recommended Standard Best Management Practices

The U.S. Fish and Wildlife Service (USFWS) recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Best Minagement Practices (BMPs) include the incorporation of procedures or materials that may be used to reduce either direct or indirect negative impacts to aquatic habitats that result from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the USFWS, other federal, state or local agencies. If you have questions concerning these BMPs, please contact the USFWS Aquatic Ecosystems Conservation Program at 808-792-9400.

- Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.
- 2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle testing and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.
- 3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.
- 4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; matine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP see http://www.haccp-nrm.org/Wizard/idefault.asp) can help to prevent attraction and introduction of non-native species.
- Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (e.g., with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.
- 6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.
- All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter labric or native or noninvasive vegetation matting, hydro-seeding, etc.

Ho'okuleana LLC

... to take responsibility ...

Peter T. Young 1539 Kanapu'u Drive Kailua, Hawai'i 96734 (808) 226-3567 (Cell Phone) peter.t.young (Skype) PeterYoung@Hookuleana.com



Mr. Aaron Nadig, Island Team Manager US Fish and Wildlife Service Oahu, Kauai, North Western Hawaiian Islands and American Samoa Pacific Islands Fish and Wildlife Office 300 Ala Moana Boulevard, Room 3-122 Honolulu, Hawaii 96850

Subject: Environmental Impact Statement Preparation Notice (EISPN) - HoKua Place

2015-TA-0102

Dear Mr. Nadig:

Thank you for your letter dated January 16, 2015 regarding HoKua Place.

We have forwarded your letter to the project's appropriate sub-consultants for review. The draft Environmental Impact Statement (DEIS) for the project will address these issues and include appropriate edits based on your letter. Thank you for your comments.

Sincerely,

Peter T. Young

Do well by doing good.

Peter T Young

From: Forest Shomer [ziraat@olympus.net]
Sent: Thursday, January 22, 2015 3:43 PM
To: luc@dbedt.hawaii.gov

To: luc@dbedt.hawaii.gov
Cc: info@hookuleana.com
Subject: Hokua Place EISPN Comments

Commissioners:

The proposal for enormous development at Hokua Place is alarming. It implies traffic gridlock at any number of choke points in the limited road system.

Gridlock already occurs at times, on an everyday basis, between the Wailua River Bridge and the northern end of the bypass road. Adding thousands of vehicle trips per day, which is inevitable if Hokua Place is built as proposed, would leave all residents and visitors north of the Wailua extremely vulnerable in time-sensitive situations—ranging from commuters arriving late to work, students tate to school, parents late returning from work to retrieve their keiki after school or post-school activities; to even more urgent situations such as arriving at the airport for a once-a-day flight somewhere, to emergencies like driving to Wilcox. Police, fire, ambulance-all emergency service vehicles are equally susceptible to this gridlock. Many more people are riding the Kauii buses each day, but buses too cannot proceed on a gridlocked road.

The combination of Hokua Place, and a reopened Coco Palms resort, each generating hundreds of vehicle trips per hour throughout the day, would be a 'perfect storm' rendering the northern half of the island a less desirable, or just plain undesirable place from which to come and go. The impact on tourism would be unavoidable—word travels fast among travelers these days. We surely don't want large numbers of visitors having negative experiences such as missed flights due solely to inadequate ground transportation!

If one accepts the premise that *some* development is going to occur at Hokua Place, and that Coco Palms will be adding its big share in generating traffic before very long, the County <u>must</u> anticipate and prepare by improving and expanding the road system. The cost of those improvements could and should be partly borne by those benefiting from these two developments, rather than merely free-loading their vehicle trips into the already burdened system.

I call upon the County to begin the improvement process by re-routing Kuhio Highway mauka the Coco Palms. There needs to be a new 4-lane bypass extension from the south end of the current bypass, to behind instead of in front of Coco Palms, and south via a new crossing of the Wailua, reconnecting to 3-lane Kuhio south of the Wailua.

The benefits of such a improvement include:

- --increased highway capacity at its main choke point
- --removal of the existing lanes south of the Shell station, to reconnect Coco Palms with the beach and to quiet the shoreline from the steady traffic roar
- -- an opportunity to replace or upgrade the existing sewage facility
- --improved access to the Wailua house lots area
- --resolution of the traffic congestion where the existing bypass traffic has to merge into the single southbound lane of Kuhio
- --a river crossing less susceptible to tsunami damage--which has the potential to sever traffic between the North and East shores!

Lastly: the chance to create a truly vibrant Historic Park district at the mouth of the Wailua River, an honoring of the sacredness of the location.

It wouldn't take Hokua Place to make such a road improvement/relocation worthwhile--but with Hokua Place, it would make such changes urgent and essential.

Please look for ways to get started on highway upgrades now, before rather than after any large development. Sincerely,

Forest Shomer ziraat@olympus.net

PO Box 301 Kapaa