CHAPTER 7

Policy Issues

Sustainable Yield

Lana'i has a very low sustainable yield. At 6 MGD, it is less than 1/10 that of any other major island. Unlike the other islands, Lana`i also has no flowing streams or utilizable surface water. Figure 7-3, below, shows the relative sustainable yields of the main inhabited Hawaiian Islands for comparison. Note that the recent update of the State Water Resources Protection Plan reduced sustainable yields from the 1990 estimates on virtually every island but Lana'i, although these reductions were less than initially proposed. In many cases, such decisions resulted from pumpage beginning to approach initial sustainable yield estimates, only to find that such estimates were either overly optimistic, or that distributions of withdrawals had to be increased substantially to realize them. It is not unreasonable to posit that Lana'i might one day find itself in a similar situation.

FIGURE 7-1. Sustainable Yields of Hawaiian Islands

Island	1990 WRPP Sustainable Yield MGD	2007 Draft WRPP Update Sustainable Yield MGD	June 2008 Final WRPP Sustainable Yield MGD
Hawaii	2,431	2,175	2,410
Kauai	388	306	310
Lana'i	6	6	6
Maui	476	386	427
Molokai	81 / 38 Dev	71	79
Oahu	446	419	407

Need for Improved Distribution of Withdrawals

Policy Issues

The document *A Numerical Groundwater Model for the Island of Lana'i, Hawaii* (CWRM-1, Hardy, 1996, pg. 126), "shows that **many more wells** would be necessary to achieve pumpages near the current CWRM sustainable yield estimate of 6 MGD, assuming that long term recharge conditions in the regions above 2,000' remain stable" [emphasis added].

This model assumed withdrawal of water was distributed between thirteen sources, of which two, the Upper and Lower Maunalei Tunnels were passive. Pumping was distributed among eleven sources, as shown in Figure 7-4. Pumping is currently distributed primarily among only six sources, with a seventh contributing an average of only 2,418 GPD.

More than 85% of 2008 water withdrawals on Lana'i, 1,913,310 GPD out of 2,241,222 GPD, came from the Leeward aquifer. All near term plans of LWCI or LHI to develop water are also in the Leeward aquifer. The only pumping well in Windward aquifer is Well 6, with an average 2008 withdrawal of 328,000 GPD. It is unlikely that more pumpage could be distributed to this well, because its water levels are already declining.

FIGURE 7-2. Modeled Distribution of Pumping Versus Present Distribution of Pumping

	AS MODELED IN 1996 CWRM MODEL	CWRM MODEL WELLS IN USE NOW	2008 MAV	* MOST RECENT ACTUAL MAV	* OTHER RECENT ACTUAL MAV	AVG OF NON-ZERO MAVS OVER PUMP RECORD	Comments
Maunalei Shaft 2	500,000	0	0	0	557,385	525,980	*MAV period 13 1994. In the late 1980s, more than 600 KGal came from Maunalei sources. Shaft 2 operated until 1995 with a running MAV of around 526 KGal. Stopped in early 1995.
Well 1	270,000	270,000	393,981	378,074		291,173	*MAV period 7, 2009. Water levels appear to be declining at current pumping rates.
Well 2 / Shaft 3 future "2-A"	300,000		2,418	0	302,468	228,523	*302,468 was MAV period 13, 2006. However, there have not been 13 straight periods of pumping since 1997. Period 8, 1997 MAV was 157,140 GPD.
Well 3	300,000	0	0	0	233,991	191,281	*MAV period 6, 2006. Last 13 period with continuous non-zero pumpage.
Well 4	400,000	400,000	683,867	598,677		532,729	MAV period 7, 2009.
Well 5	400,000	0	0	0	120,030	153,557	*MAV period 12, 1992. This well started in the 200-300 KGal range for 2 years, and then dropped steadily. Period shown is last continuous non-zero MAV use.
Well 6	300,000	300,000	327,912	303,118		432,557	MAV period 7, 2009.
Well 7	200,000	0	0	0			No continuous pumpage record. One monthly number in 1992.
Well 8	300,000	300,000	276,890	255,469		121,459	*MAV period 7, 2009.
Well 9	270,000	270,000	151,440	127,851		224,302	*MAV period 7, 2009.
Well 12	0	0	0	0	14,305	10,316	*MAV period 13, 1995. Started at 17.8 KGal & declined continously. Use stopped in 1997.
Well 14	280,000	280,000	404,714	323,302		336,913	*MAV period 7, 2009.
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	3,520,000	1,820,000	2,241,222	1,986,491	1,228,179	3,048,790	Average over pump record is high. These wells have not pumped at same time. Difference between 2,238,804 and 2,241,222 is less than 1%, and results from different averaging method.

As modeled in CWRM-1, Hardy, 1996. Modeled scenarios were based on pumpage at the time and various pumpage scenarios that had been proposed at the time.

Declining Water Levels

At 2008 pumpage rates, water levels in several wells are declining (Wells 1, 9, 14, 6 and 8). Pumps have been lowered recently in several wells with Well 9 showing particular stress. Since 2003, the pump in Well 9 has been lowered 442 feet. Water levels are within 48 feet of the "Action Level" in CCR's proposed operating guidelines, and continue to decline. Chlorides have also been rising in the 15 MG reservoir. This is not due to rising chlorides in the wells, but rather to increased use of the higher chloride Well 14 to supplement Wells 1 and 9. However, it does affect the amount of salt that is introduced in irrigation at Manele. LHI is taking action on this situation, by drilling an additional well, Well 15, to distribute withdrawals. How much water and at what quality this well will produce remains an open question. While a certain amount of decline in water levels is to be expected, caution and circumspection would still seem warranted.

Water levels in the wells mentioned are plotted below. In each of these graphs, the green line represents the initial water level. The yellow line is the action level set in the LWCI operating guidelines. The red line is the lowest allowable level in the LWCI operating guidelines. A pink line is plotted, and is the CWRM trigger for designation proceedings, but it is so close to the red line that the two are not distinguishable. The dotted black line is the pump level. The thick blue line is the low water level and the thin blue line is the high water level.

FIGURE 7-3. Water Levels - Well 1

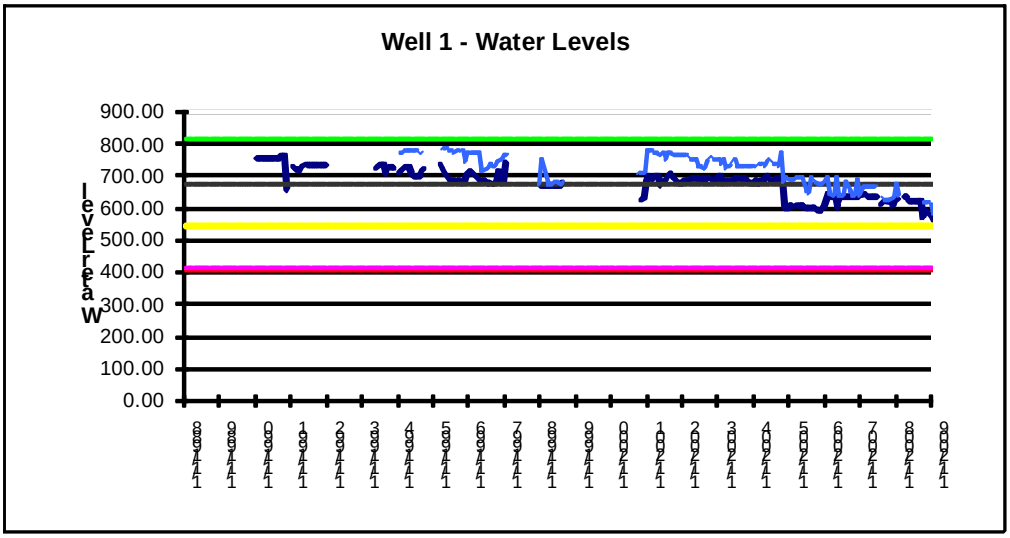


FIGURE 7-4. Water Levels - Well 9

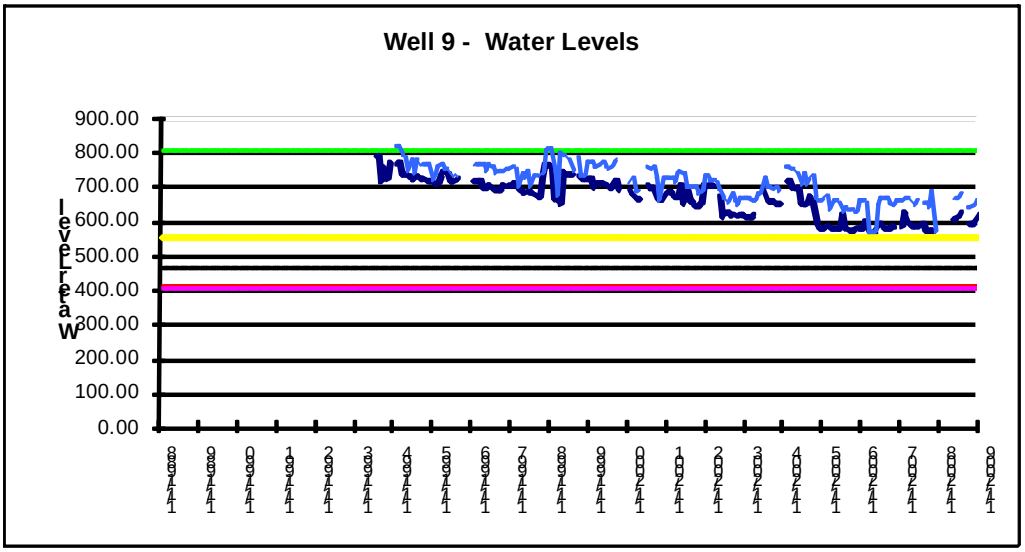


FIGURE 7-5. Water Levels - Well 14

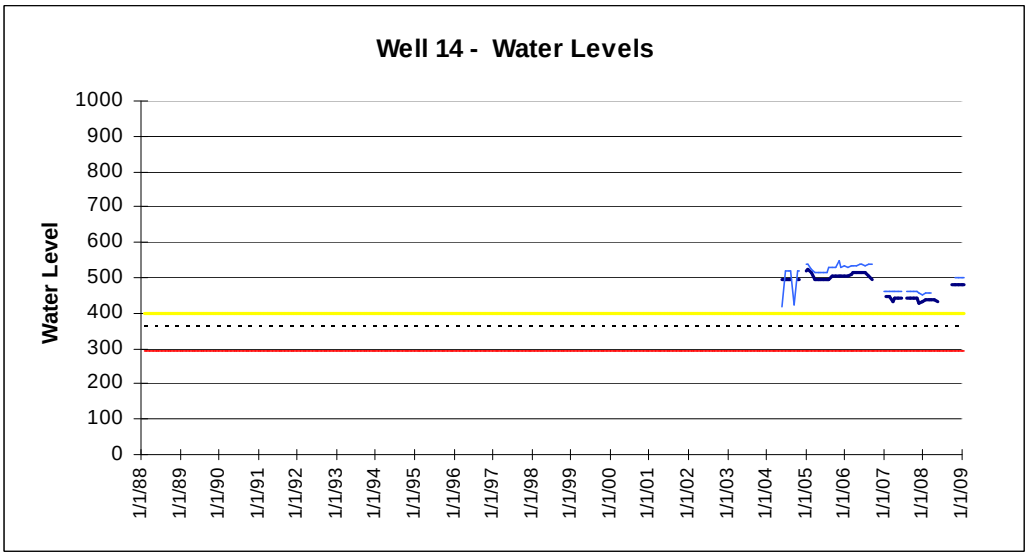


FIGURE 7-6. 15 MG Brackish Reservoir - Chloride Levels

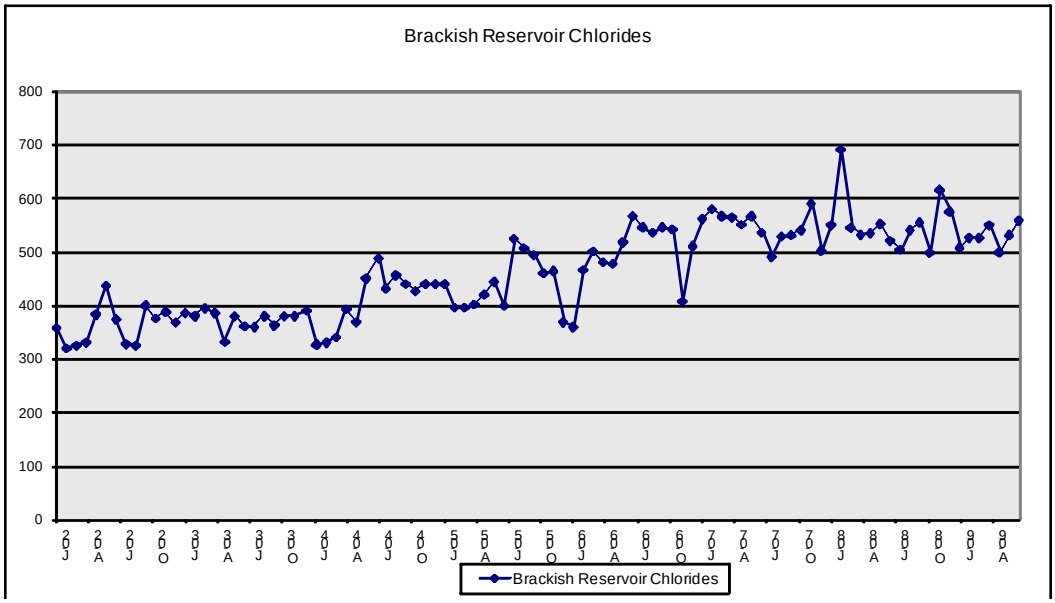


FIGURE 7-7. Well 6 Water Levels

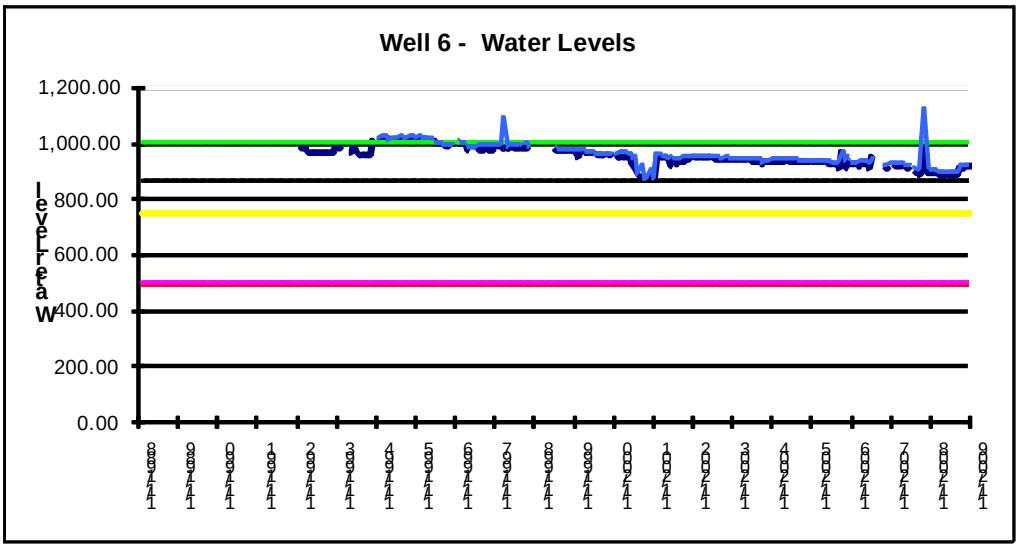
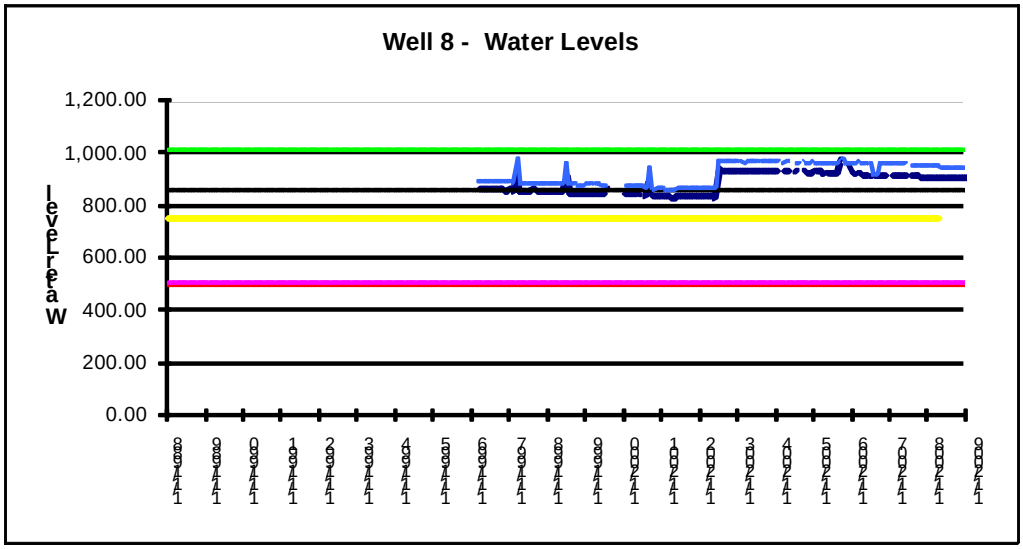


FIGURE 7-8. Well 8 Water Levels



Green - Initial Water Level; Yellow - Action Level; Red - Lowest Allowable Level; Pink - Trigger for Designation Proceedings; Dotted - Pump Level, Thick Blue - Low Water Level; Thin Blue - High Water Level

Importance and Condition of the Mauka Watershed Forest

The *Numerical Groundwater Model for the Island of Lana'i Hawaii* (CWRM-1, Hardy, 1996) "...predicts that the reduction of forest cover would affect ground water levels drastically." (pg. 126) The model indicates that fog drip is a major contributor of recharge to the primary high level aquifer. Fog drip is estimated to contribute 8.87 MGD of a total 13.5 MGD in estimated recharge (65.7%). Loss of fog drip from the forest, even with zero pumpage, would result in a severe drop in water levels, on the order of 25% to 30%. With 6 MGD pumpage, that drop would be even more severe, with water levels dropping 50% within the modeled period. (CWRM-1, Hardy, 1996, pgs. 44, 105 & 112 - described in Chapter 3 of this document).

The mauka watershed forest is exceedingly compromised. By 1993, two thirds of cloud forest vegetation had been lost. (Hobdy, 1993). Despite efforts to install fencing and manage feral ungulates, the Lana'ihale watershed continues to decline. (Hobdy and Penniman, minutes of 5/30/2008 meeting). Increment I of a three-phase project has been completed. However, fencing for the most critical habitat area must wait for Increment III. This is still years away, and funding is uncertain. Whether or not cost recovery for this increment is folded into the final rates of the LWCI, additional major entitlements for CCR should be conditioned upon continuing watershed protection, and most especially upon construction of Increment III of the fence.

Historical Water Allocations

Hawaii Revised Statutes (HRS) §174-C-31 (a)(2) states that the Water Use and Development Plans for each county shall set forth the allocation of water to land use in that county. However, the statute is not prescriptive about how such allocations should be made. Conceivably, allocations could be made in any number of ways, from broad-brush statements about general priorities for each type of water, to accommodating land use forecasts for each sector, to specific and explicit review of every planned use and source. Similarly, such allocations could address the "bottom line" at the end of the planning period and ignore timing, or could address the pace and schedule of resource use.

Regardless of the manner in which allocations are set, they must be set within certain parameters. They must be consistent with Community and General Plans. They must incorporate the current and foreseeable development and use needs of the Department of Hawaiian Homelands. They must reflect the responsibility of the counties set forth in Article XI of the constitution that the State *and its political subdivisions* have the responsibility to protect and conserve resources. In other words, protection of resources is a public trust obligation for which the State has primacy, but from which the counties are not exempt. Given a public trust obligation, a precautionary principle is warranted where applicable in setting water allocations.

1997 Allocation Agreement

Source water use estimates from the 1997 Water Working Group Report are presented in Figure 7-1. These were the starting point for allocation discussions by the Water Advisory Committee for this update. Two key points of the 1997 consensus were:

- Total potable and brackish water use for the Manele Project District should be limited to 1.03 MGD, regardless of any approvals that would result in a higher build-out. High level brackish water use is limited to 650,000 GPD, to be decreased as increasing reclaimed water becomes available. Use of reclaimed water for irrigation should be maximized.

- No high-level water should be utilized to irrigate the Koele Golf Course, with the exception of the special conditions provided for in Ordinances 2515 and 2516, described in Appendix B.

The 1997 allocation agreement remained the consensus agreement of the LWAC until 2002.

Island-wide water use, at 2.24 MGD in 2008, was considerably less than the projected 3.72 for 2010.

Consumption for the Manele Project District area reached 1,082,999 GPD in 2008. Only a small portion of the Project District has been built. Of 282 Single Family units permitted under the Project District Ordinance, only 17 units have been built. Half the hotel units have been built. The project is not even close to full build-out. Similarly, in Koele Project District, only 13 of 535 eventual single family units have been built.

FIGURE 7-9. Water Use Allocations from 1997 Water Working Group Report

LAND USE CATEGORY	Present (97) mgd	2010 mgd	Future mgd	Source of Wate
Residential	0.274	0.414	0.494	Primary
Agriculture	0.219	0.50	1.50	Primary
Commercial & Institutional (10 addditional acres)	0.379	0.439	0.439	Primary
Light Industrial (15 acres)	0	0.09	0.09	Primary
Kaumalapau Harbor	0.009	0.01	0.01	Primary
Lanai Airport	0.004	0.005	0.005	Primary
Manele Project District	0.078	0.68	1.03	Primary & Seco
Manele Golf Course	0.51	0.65	0.65	Secondary
Manele Effluent	0.05*	0.07*	0.14*	Effluent
Koele Project District	0.096	0.20	0.42	Primary
Koele Golf Course	0.25*	0.25*	0.25*	Effluent
Subtotal Groundwater	1.569	2.99	4.64	Primary & Seco
System losses 12% future	0.134	0.41	0.63	
Subotal Groundwater	1.703	3.40	5.28	
Total Effluent	0.3	0.32	0.44	
Total Water Demand	1.73	3.72	5.72	

*Reclaimed wastewater effluent

**Sources of Water:
Primary= Wells 2,3,4,5,6,8, Maunalei

Secondary=Palawai (Wells 1,7,9,10) and beyond

Effluent=reclaimed water

Water Demand Associated with Build-out of Entitled Projects

Build-out of Existing Approvals / Partial Entitlements Could Create Demands Exceeding Sustainable Yields

Absent measures to mitigate withdrawals, existing partial entitlements in the form of Project District approvals, could cause demands to meet or exceed the sustainable yield of one or both aquifers. This is shown in Figures 4-59 and 4-60 of the *Demand Analysis* Chapter. Project Districts plus additional entitlements requested in the CCR proposals, plus non-company projects, would lead total demands to exceed the sustainable yield of the aquifer, as shown in Figures of the *Demand Analysis* Chapter. Build-out of the portions of Project Districts which already have Phase II approvals will lead to a total withdrawal of about 3.66 MGD. This assumes unaccounted-for water could be cut to 15% in the Manele Project District and Palawai Grid areas. At current island-wide unaccounted-for water rates, build out of the Phase II entitled portions of the Project Districts, without additional development in the Windward aquifer, could lead to exceedence of sustainable yield in the Leeward aquifer. These estimates are tallied in Figure 4-76 of the *Demand Analysis* Chapter.

CCR Proposals Include Project Elements Beyond Those In The Approved Project Districts

The CCR proposals indicate additional project elements beyond those already entitled or partially entitled. It also does not include all of the partially entitled project elements in the PD. Differences between build-out of proposals and project district entitlements are delineated in Figure 4-75 of the *Demand Analysis* Chapter. The 2006 proposal for Koele includes 90 Multi-Family units, 425 Single-Family units and 250 Hotel units, while the PD allows for 156 Multi-Family, 535 Single-Family and 253 Hotel units. In Manele, the proposal calls for 200 Single-Family units, 300 Multi-Family, 400 Hotel units, and 10 acres of Commercial area, while the PD allows for 282 Single-Family units, 184 Multi-Family units, 500 Hotel units, and 5.25 acres of commercial. CCR was asked in discussions whether it would be willing to trade additional elements noted above for project elements not included in its proposal. CCR personnel responded that they preferred to reserve the full PD approvals, even though these may not be built-out within the planning time frame. For example, the 2006 proposal raises the count of MF units in the Manele Project District from 184 to 300. At the same time, it omits 82 of the SF units allowed in the Project District. In this scenario, the full count of 200 single family units would still be built, so the net effect would be the addition of 116 MF units. The problem with this logic for Lana'i is that the existing approvals and the proposed approvals both have the ability to render demand higher than sustainable yield. Adding additional entitlement without benefit of clearly identified source raises concerns regarding sustainability of the aquifer. While it is understandable that any business would want to maximize the flexibility of its options, in this case it is recommended that such flexibility be obtained by trading some entitlements for others, rather than by adding more, until more is known about the response of the aquifer to build-out of existing entitlements. This will require interagency coordination. Figure 4-61 is a table of current Project District build-out status. Figures 4-65 and 4-66 are attempts to map this status into Phase I, Phase II and Phase III approvals. Some difficulty was encountered in mapping, as certain unit counts were not tied to specific counts on Project District maps. It is both recommended that this be addressed, and hoped that it may be already being addressed in preparation for the Community Plan process. In any case, discrepancies between proposals and Project Districts as approved, plus the addition of other projects not part of the Project Districts point to the need for both clear allocations and for convenient tracking mechanisms such as the maps described.

Demand Generated From Project Approvals Is Not Immediately Apparent

There is a time lag between when projects are approved and when their full water consumption is reached. Even once projects have been built, there is a time between construction and full occupancy. Therefore, it is possible that additional approvals could be issued before the full impact of already-approved developments is accurately known and gauged. A reviewing governmental body may ask for a comparison of present consumption figures, and incremental additional use represented by the project, without being fully aware of or able to visualize the magnitude of demand still pending. One way to limit the probability of this becoming an issue is to identify sources for each approval, including all existing and planned project elements anticipated to rely on those sources, and to proceed slowly and deliberately with regard to build-out.

Econometric Trends from General Plan Update Data and Time Trends Both Indicate that the Natural Pace of Growth Would Be Slower Than That Proposed

Forecasts range from 2.43 MG to 5.03 MGD, with the base case between 2.6 and 3.5 MGD. Build-out analysis, on the other hand, ranges from 6.08 to 7.13 MGD, or 5.66 MGD for Phase II. The recommended allocation is consistent with the SMS base case forecast at an elasticity of 1.5, allowing slightly

more consumption than the base case and elasticity calculated for other communities on Maui, but not so much as full build-out.

Proposed and Empirical Unit Consumption Are Considerably Higher Than Standards

Both proposed and actual demands in the hot, dry Manele area exceed *System Standard* guidelines. However, in some cases hundreds or even thousands of gallons per day of brackish water are used, even when potable consumption is at or near zero. This and other observations led to the impression that occupancies of these single and multi-family residences can be low, while most of the water goes to irrigation. In turn, this would lead to a lower available return of reclaimed water per unit of build-out. The question was raised by LWAC and discussed at length as to whether per-unit consumption rates exhibited and proposed were reasonable. Water consumption by single family lots in Manele Project District averaged 3,700 GPD in 2008, with a high of over 9,000 GPD. Most of these are half-acre lots. Among the recommended measures are a tiered rate structure and a landscape conservation program with the objective of reducing per-unit consumption.

Conservation Potential

System wide unaccounted-for water averages about 0.633 MGD, or 28.36% of total production. There are several potential sources of such unaccounted-for water. Pipelines in the Palawai Irrigation Grid are old, deteriorated, and subject to high pressures. Leak detection has been performed by visual inspection, "walking the lines", for years. This generally indicates an old system in poor repair. A leak has to be either quite large, or to continue for a long time, or both, before visible signs reach the surface. Other lines are old and sub-standard as well, such as the Kaumalapau line. There is a 15 MG uncovered reservoir where evaporation and other losses are suspected to be high. Also on the brackish system, some unmetered uses were found during the drafting of this document. There is a 1.5 MG covered reservoir which is over fifty years old but lined at the bottom only with old concrete. In addition, end uses demonstrate high per unit consumption, most of which is attributed to landscape. Landscape use is estimated at 1.1 MGD. Per unit consumption rates are high, with much of this going to the landscape. Hotel uses are about 0.27 MGD, roughly half of which is presumed to be outdoor use and included in the 1.1 MGD total. About 485,000 gallons of target savings have been identified in the Supply Options chapter of this document, and are included in the allocation proposal.

Green - Initial Water Level; Yellow - Action Level; Red - Lowest Allowable Level; Pink - Trigger for Designation Proceedings; Dotted - Pump Level, Thick Blue - Low Water Level; Thin Blue - High Water Level

Forest Management and Watershed Protection

Over 65% of the recharge in the primary high level aquifer is attributable to fog drip (Hardy, CWRM, 1996). Forested watershed is critical to maintaining water availability on Lana‘i and yet the native forest on Lana‘ihale is diminishing.

The Lana‘i Water Advisory Committee deemed watershed protection important enough to warrant an entire section of the Water Use and Development Plan. Through several community meetings, a fence alignment and plan to protect the watershed were agreed upon. Other protective recommendations are delineated in the *Source Water Protection* chapter and in the *Implementation Matrix*.

Aside from protective measures identified in that chapter, several policy questions relating to watershed protection were raised in the course of Water Advisory Committee discussions.

Relationship of Forest Protection to Build-out of Entitlements

Continued protection of the watershed, and most particularly construction of Increment III of the Lana‘ihale Fence, were deemed of utmost importance. One way to ensure that such protection continues is to tie continued protection of the watershed forest, and /or specific protective measures, to entitlements. Due to uncertainties as to the timing of construction of Increment III, the enclosure for the best remaining native watershed on the island, it was decided that construction of this fence should be linked to allocation table triggers.

Provision for Forest Protection In Water Utility Rates

Statewide, many utilities have objected to a mandatory provision to address watershed protection in the rates. However, one of the primary reasons has been that drinking water utilities throughout most of the Hawai‘i are not the only, nor even the major users of water, and as such it seemed to be placing an unfair burden on utility customers. On Lana‘i, there are no such complications. All drink from the same source and that source is dependent on the forest. Therefore, the financing plan proposed included watershed protection, specifically construction of the Increment III Fence, deemed crucial to the viability of remaining native watershed.

Aquifer Monitoring and Protection

With a low sustainable yield, declining forest cover, declining water levels and an ambitious build-out proposal, several members of the LWAC expressed concern about extending the life of the aquifer. Such concerns gave rise to the concept of the allocation plan discussed earlier.

In addition to recommended limitations on withdrawals, LWAC members discussed the idea that an allocation plan should include triggers of actions to be taken when pumpage reached certain levels. For instance, total island-wide withdrawals should not exceed those modeled in scenario 6 of Hardy’s numerical groundwater model, without additional distribution of withdrawals or other actions.

The results of Hardy’s numerical groundwater model indicated that the 13 sources modeled should be able to yield 3.52 MGD from the aquifer, without severe water level declines. However, pumpage is currently distributed between only 6 or 7 sources (one source pumps only 2,000 GPD), and, as noted

elsewhere, water levels are declining. Some LWAC members have expressed some concerns about adequate distribution of withdrawals. The implementation chapter lists a schedule of near term, mid term and long term source improvements.

For the planning period, or until new sources can be brought on line to better distribute withdrawals, it is recommended that a minimum 10% resource reserve be maintained in each aquifer. This would enable pumpage impacts on the aquifer to be better evaluated before the full yield is utilized. This recommendation is consistent with other criteria used by the State, such as the criteria for designation of a groundwater management area in §13-171-7 of the State Water Code, which reads, "whether an increase in water use or authorized planned use may cause the maximum withdrawal from the groundwater source to reach ninety percent of the sustainable yield of the proposed water management area." It is also consistent with other CWRM actions, such as the 90% sustainable yield trigger that was set for Iao aquifer. This would limit pumped water to a total of 5.4 MGD, and water pumped from each aquifer to a total of 2.7 MGD during the planning period. A total of 600,000 gallons in resource reserve is included in the allocation plan. However, this amount does not affect other uses within the allocation plan, as each use was escalated separately with the planning time frame.

Key recommendations with regard to source development include:

- New source development should commence at or before the point total pumpage reaches 3 MGD (At current Well 6 pumping rates, this would be 2.7 MGD in the Leeward aquifer).
- Project build-out should take place at a pace that enables continued monitoring of the status of the aquifer and watershed.
- Build-out approvals should be contingent upon continued efforts to protect and preserve the watershed in Lana'ihale.
- Operational guidelines should be followed to avoid over-pumping and ensure adequate distribution of withdrawals.

Wellhead protection was also discussed. Protection of wellheads or potential future wellheads from potential contaminant sources is an important source protection measure. A wellhead protection strategy is presented in Chapter 6 of this document, as well as in Appendix F.

Operational Guidelines

Early LWAC discussions stressed the need for guideposts to help Committee members and water managers know when action must be taken to prevent over pumpage. Guidelines were proposed by CCR and reviewed by CWRM. These are described briefly in the *Source Water Protection* chapter. As stated above, it is recommended that these be followed.

System Monitoring & Maintenance

System monitoring and maintenance was at times a heated topic within the Lana'i Water Advisory Committee. The recommendations here are not strictly policy matters, but arise from the community's desire to have adequate information about the status and condition of the water system.

Maintenance

As demand for water and cost of electricity increase, maintenance will become increasingly important. Unaccounted-for water on Lana'i presents opportunities to provide for demand while still extending the life of the aquifer. Replacement of old degraded pipe, leak detection equipment, pipe repairs, annual unaccounted-for water analysis and other measures are recommended to provide for source availability as well as to save money and resources. These are described in the Supply Options chapter.

Metering and Monitoring

Metering and monitoring have improved in recent years. Previously unmetered uses are now metered, and other improvements have been made. However, LWAC members have raised concerns regarding the Periodic Water Report

Maui County Ordinance 2408 stipulated that the total amount of non-potable water drawn from the high level aquifer that may be used for irrigation of the golf course, driving range, and other associated landscaping, shall not exceed an average of 650,000 gallons per day, expressed as a moving annualized average using 13-28 day periods rather than 12 calendar months, or such other reasonable method as may be determined by the Maui County Council upon advice from its standing committee on water use. This was likely written to enable the company at the time to continue its 28 day reporting without disruption. Since that time the question of monthly reporting has come up repeatedly. The pumpage record goes back to 1926. For most of that record, either reporting was in fact on a monthly basis, or whoever maintained the data at the State reconciled it back to a monthly basis. In any case, the majority of the available record is recorded on a monthly basis. The system of thirteen 28 day periods started in 1981, continued to 1986, stopped for a time, and then resumed from 1987 to the present. Depending on how this is accomplished, there are some advantages to reporting both pumpage and withdrawals on a monthly basis. Today's meters are capable of recording historical flows, such that the flow at any chosen period can be derived. Unaccounted-for water analysis now requires that billing and pumping records be broken down and re-apportioned to the number of days in a month or period, in order to ensure that pumping and billing are examined for the same period. If flows from the same periods were utilized, then this process would be streamlined. However, there appears to be some hesitancy to make this change, because of the outstanding ordinance.

Another issue raised with the Periodic Water Report has been the break down of water service areas. As discussed in the *Demand Analysis* chapter, the periodic water report has a service area subtotal called "Manele, Aoki Diversified, Agriculture and Ag Activities near the Airport." This was apparently intended to maintain consistent data breakdown, but more accurately re-name what was once simply called "Irrigation" (in the days of pineapple). Based upon today's uses and service areas, this breakdown makes little sense. In terms of pumped water, there are two public water systems on Lana'i, and essentially 5 service district areas, distinguished by sources and tanks serving them and by pressure zones. These are the Koele Project District Area, Lana'i City, Kaumalapau, the Palawai Irrigation Grid, and the Manele Project District Area. The Manele Project District Area is further broken into fresh and brackish service. It would seem that the reports could be clarified by distinguishing these areas. Another item repeatedly desired by the committee was a more discernible breakdown of what amount of brackish water goes to the golf course vs. other irrigation, and what amount of potable water goes to irrigation vs. other uses, most especially in Manele.

Current billing user types maintained in the LWCI data base are shown in Figure 7-13.

FIGURE 7-10. Use Types in Current CCR Database

R. Residential						
C-Commercial						
G-Government						
Z-Community Gardens						
L-Non Resorts (Central, Plantation Homes, Iwiole, Commercial Homes, etc.)						
P-Four Seasons						
V-Development						

A further breakdown of residential multi vs. single family use is provided for Manele and Koele in the district code, but no such breakdown is provided for Lana'i City. Current utility personnel are sufficiently familiar with the system to know which meters are which. The data system is clearly useful for internal accounting and operations, which would naturally be of highest concern to the utility. However, an additional field might be useful for auditing and reporting, as well as for rate-setting. Certain meters are classed in ways that are non-intuitive to an outsider - not incorrectly, but based as much on internal company operations as on the actual use class. For an outside analyst, or even an internal one, to go through and reclass each meter, even based upon personal familiarity with each, is a time consuming effort. For purposes of water audit, data reporting and other uses, it may be beneficial to add a field to the data base that breaks user classes out by more conventional use types. This could be done without any change to the primary breakdown and functioning of the database and may prove to be a useful option. It would be especially so, in fact maybe even necessary, if the proposed rate structure, or one like it, were established. Another value of such a change would be the ability to report more clearly on the status of build-out versus any agreed upon allocation. A more practical breakdown for planning purposes might be:

Single Family
Multi-Family
Commercial
Industrial
Hotel
Government
AgriculturalIrrigation
Other Irrigation

Rate Equity

While LWAC members had no objection to the use of desalinization as a major water source, some expressed concern that the expense of new source development to accommodate project district build-outs not burden the existing residents of Lana'i, or that long-time residents not have to experience fees raised to a level to accommodate build-out growth.

The rate and fee structures proposed in the Supply Options chapter are designed to keep rates low for low water users, and to encourage conservation by sending a pricing signal to high water users. New source would be paid for by new meters or by the company.

Conservation Measures and Milestones

The Lana'i Water Advisory Committee spent much time discussing high consumption rates per unit, system losses, unaccounted-for water, and the need for conservation. A few iterations of a draft conservation ordinance have also been presented to the LWAC. The most recent of these is attached as Appendix I. System wide unaccounted-for water in 2008 was roughly 28%, with about 13.5% in Lana'i City, 45% on the potable Manele / Palawai Irrigation Grid system, and 19% on the Brackish system. A target program was developed that included the following measures and targeted savings:

FIGURE 7-11. Targeted Conservation Savings

	Manele & Grid Fresh	Manele Brackish	Lanai City Koele & Kaumalapau	
Palawai Grid	200,000.0			200,000
Landscape	50,000.0	50,000.0	11,000.0	111,000
Fixture Replacement	20,000.0		80,000.0	100,000
Leak Detection & Repair	15,000.0	13,000.0	12,000.0	40,000
Hypalon Cover		14,000.0		14,000
Hotel & Landscape Incentives	12,000.0	6,000.0	2,000.0	20,000
Rate Structure				0

These measures may still fall short of achieving targeted unaccounted for water rates in one or more areas, particularly in the service area of Wells 1, 9 & 14. Additional reductions should be possible through additional landscape savings beyond the modest 10% prescribed or additional leak identification. Metering of previously unmetered services will also help to reduce UAFW, though it may not help to reduce pumpage.

Agricultural Reserve

There is strong conviction among certain community members that preservation of agricultural opportunities should not be lost. LWAC members expressed concern that build-out of the project proposals by CCR could preclude there being enough water for the planned Agricultural Park. Agricultural lands offer many benefits, including increased food security, and economic development opportunities. The recommended allocation plan includes a 500,000 GPD agricultural reserve, which is assumed to be actually withdrawn from the aquifer, as opposed to the resource reserve, which is not assumed to be pumped. Neither reserve affects water allocations to other uses within the planning time frame, as each class of use was escalated separately, and there was adequate water to cover uses and reserves based on the forecast coefficients used.

Issues Pertaining to Specific Supply Options

Selecting new source options always involves some trade-offs. Lana‘i is no exception.

Several good Leeward locations have been identified for new source, but at some point, these will start to provide only distribution of withdrawals, rather than additional source.

Development of a windward well is recommended, but this is not without challenges either. On the windward side, whether Maunalei or Kehewai are chosen, the transmission route will be long and expensive. The transmission route to Kehewai was designed in such a way to avoid damage to crucial habitat.

On the other hand, both the Maunalei and Kauiki options are in the greater ahupua‘a of Maunalei. During the Mahele of 1848, 19 individuals made 20 claims for property rights in the ahupua‘a of Maunalei. The entire ahupuaa was granted to Pane Kekelaokalani, a chiefly awardee (who filed two separate claims). At the close of the Mahele in 1855, at least 11 commoners claims were also granted. The clustering of kuleana lands deep in the valley of Maunalei include the claims for lo`i kalo (taro pond fields) and the associated water rights as protected by the Kuleana Act of 1850. At the time of this writing, it is unclear if any native claims remain to kuleana lands and water resources in Maunalei. It is noted that company maps dating from 1929 to 1993 still identify possible lots in the valley to which such water rights might appertain. It is suggested that a definitive study on the native tenant rights and disposition of land ownership be determined prior to final settling of water usage in Maunalei.

Desalinization is still expensive, and proper disposal of brines can prove difficult. CCR will need to accommodate the fact that marine waters surrounding Lana‘i are Classed AA under HAR §11-54-3. The objective of Class AA waters is that they remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused sources or actions. To the extent practicable, the wilderness character of these areas must be protected. No zones of mixing are permitted in this class.

Community Plan Consistency

The Maui County Charter, §8-11.2(3) requires that the Water Department’s Long Range Plan conform with the County’s general and community plans. The last version of the Lana`i Community Plan was adopted by the Maui County Council on December 8th, 1998. An update of the plan is expected shortly, However, some of the goals, objectives, policies and implementing actions that pertain to water issues within the old plan are attached as an Appendix J, with comments as to how this WUDP addresses those items.