Honolulu Board of Water Supply

Stakeholder Advisory Group

Meeting 3 – September 16, 2015, 4:00 pm to 6:30 pm

Honolulu Club, Hawaiian Electric Co. Training Room

Meeting Notes

PURPOSE AND ORGANIZATION OF MEETING NOTES

The purpose of these notes is to provide an overview of the Board of Water Supply (BWS) Stakeholder Advisory Group meeting. They are not intended as a transcript or as minutes. Major points of the presentations are summarized herein, primarily for context. Copies of presentation materials were provided to all participants and are available on the BWS website. Participants made many comments and asked many questions during the meeting. These are paraphrased to be more concise.

ATTENDEES

There were 18 stakeholders, 4 members of the public, and BWS and CDM Smith staff present. The BWS's division managers also attended. The stakeholders represent diverse interests and communities island-wide.

The following Stakeholders Advisory Group members attended:

Jackie Boland	AARP
Pono Chong	Chamber of Commerce
Bill Clark	Resident of City Council District 6
Neil Hannahs	Kamehameha Schools
Shari Ishikawa	Hawaiian Electric Co.
Micah A. Kāne	Pacific Links Hawaii
Will Kane	Mililani Town Association
Helen Nakano	Resident of City Council District 5
Robbie Nicholas	Hawaii Kai Golf Course
Dean Okimoto	Nalo Farms

Kathleen Pahinui	Resident of City Council District 2
Dick Poirier	Resident of City Council District 9
Elizabeth Reilly	Resident of City Council District 4
Cynthia Rezentes	Resident of City Council District 1
Francois Rogers	Blue Planet Foundation
Josh Stanbro	Hawaii Community Foundation
Christopher Wong	Resident of City Council District 7
Suzanne Young	Honolulu Board of Realtors

MEETING AGENDA

- Welcome
- Public Comment on Agenda Items
- Accept Notes from Meeting 2 (For possible action)
- Stakeholder Input to the Water Master Plan (For possible action)
- Water Supply and Demand (For possible action)
- Water Conservation (For possible action)
- BWS Updates (Information only)
- Summary and Next Steps (Information only)

WELCOME

Dave Ebersold, Facilitator and Vice President of CDM Smith, welcomed the group. Dave explained that this would be a very interactive meeting and he asked the stakeholders to get ready to participate.

Dave welcomed Chris Wong of CD 7, a new participant.

PUBLIC COMMENT ON AGENDA ITEMS

None.

REVIEW and ACCEPTANCE OF NOTES FROM MEETING 2

Notes from Meeting 2 held July 21, 2015 were accepted.

STAKEHOLDER INPUT TO THE WATER MASTER PLAN (WMP)

Dave Ebersold began by presenting an overview of how the WMP links BWS initiatives, the process to set priorities for projects identified in the WMP, and the projected role of the Stakeholder Advisory Group in striking a balance between water system adequacy/dependability and cost/rate affordability. Stakeholders expressed a desire for greater clarification of these areas during the Objectives session at Meeting 2.

Dave showed a diagram that illustrates how the BWS's vision, mission and strategic plan form the core of its planning initiatives including the Water Conservation Plan, Watershed Management Plans, Energy Savings Program, and the Water Master Plan. The WMP provides a link between initiatives that previously were not connected. This is shown by its position on the graphic linking the Watershed Management Plans and the Water Conservation Plan. This is an indicator "Where are we now?", meshing multiple initiatives while developing a comprehensive, research and a fact-based picture of what needs to be remedied, changed or added to the BWS water system, all within the WMP.

Successful implementation of the WMP will require a delicate balance between water service adequacy/ dependability, and infrastructure costs/ rate affordability. This is the desired future state, or "where we want to be." Achieving this balance will not be a simple task. One of the key reasons the Stakeholder Advisory Group was brought together is to help the BWS to achieve that balance.

Dave referenced the infographic presented at the first stakeholder meeting, describing the key steps of the Water Master Planning process:

- assess the condition,
- compare,
- identify,
- prioritize,
- analyze, and
- develop.

Prioritizing infrastructure projects is a critical component of determining "How do we get there?" This process is currently underway. The WMP will present needed improvements over a 30-year period for a system that includes 2,100 miles of pipeline, 90 booster pump stations, 171 reservoirs, and 94 potable water sources. It can be expected that the efforts to assess, compare, and identify system needs will result in several thousand potential projects. It would be impossible for the BWS to handle these all at once, and it would not be affordable for customers. So, the BWS will prioritize projects based on risk. Risk is a function of the likelihood of failure and the consequence of that failure.

Evaluation of the likelihood that components of the system will fail is based on their expected functional life, performance, and findings of the condition assessment. Consequence refers to the impacts should a failure occur. For example: if a pipeline breaks and cuts off supply to hospital or emergency service, the consequences could be extremely serious. To establish the level of risk for each facility, the rating for the likelihood of failure is multiplied by the rating for the consequence of failure. Projects with the highest resulting risk score would be given priority for funding and implementation.

Infrastructure risk, prioritization and costs are large parts of the WMP. But the Stakeholder Advisory Group has made clear that if the WMP just addresses water infrastructure, it will not be enough. Based on this input, the WMP team is adding two chapters to the WMP report: one on Sustainable Water Management and the other on Implementation. The BWS believes that these additions will make the WMP more robust and will better reflect community values the stakeholders have voiced.

Technical evaluations of the WMP began approximately two years ago. Although specific types of facilities are being assessed concurrently, their evaluations will be completed at different times. The BWS expects to have a draft report in mid-2016. To produce the draft WMP and the corresponding Capital Improvement Plan (CIP), the WMP team will make some initial assumptions such as holding current levels of funding steady for programs related to conservation and watershed protection, in addition to funding new capital improvement projects. This will provide a baseline when the Stakeholder Advisory Group looks at how to balance water service adequacy and dependability, with infrastructure costs and rate affordability.

Over these next few months, as the WMP team continues its work, you will hear the results of condition assessments and supply evaluations, to better understand "Where are we now?" The topics for Meeting 3 cover forecasting and what the BWS is doing to evaluate climate change, so members of your group understand more of the details of "What's going on around us?" As the WMP team completes hydraulic modeling and system analyses, you will receive information on the results and what it all means. In a future meeting, we will re-visit the draft WMP objectives to develop consensus on what you want the BWS to achieve through the WMP.

In late 2016, the Stakeholder Advisory Group will tackle the issue of water rates and will work to strike a balance between aspirations for the water system and the realities of what it will cost. Your group will focus on issues of affordability and the tradeoffs associated with various rates and rate structures. This will allow the BWS to adopt a new rate structure for implementation in 2018.

Along with providing recommendations regarding water rates, we'll ask you for recommendations for monitoring progress and, as time goes on, we'll share what that monitoring is telling us. With that information in hand, we can again ask the question "Where are we now?"

WATER SUPPLY AND DEMAND

Barry Usagawa thanked everyone for taking the time to help the BWS improve its process of creating the WMP. He also thanked Shari Ishikawa of Hawaiian Electric Co. for hosting the Stakeholder Advisory Group again.

Water supply and demand are key components of developing the WMP. There are three main considerations regarding water supply and demand on Oʻahu:

1. Water demands
2. Trends affecting water
3. Water availability and supplies

Water Demands

"Water demand" refers to how much water is needed. Barry described the big picture of water demand for Oʻahu, which includes agriculture water needs along with the BWS's customers' water needs.

To understand water demands, it's important to first understand land use plans. Land use plans drive urban and agriculture growth as well as other water uses on the island.

The City and County of Honolulu's General Plan is the main land use plan, which is currently being updated. It provides objectives for the welfare and prosperity of the people of O'ahu, including a statement of O□ahu's long-range objectives. This plan describes social, economic, environmental and design policies to guide land use and development decisions in 11 areas of consideration:

1. Population
2. Economy
3. Natural environment
4. Housing
5. Transportation and utilities
6. Energy
7. Physical development and urban design
8. Public safety
9. Health and education
10. Culture and recreation
11. Government operations and fiscal management

Agriculture is addressed under Economy.

The General Plan establishes objectives for population distribution by considering:

- Limited natural resources
- Minimizing social, economic, and environmental disruptions

It establishes land use policies that affect population distribution around the island.

The General Plan is the first component of a 3-tier, charter-mandated planning system that includes:

- The General Plan
- Development Plans and Sustainable Communities Plans
- Ordinances and Regulations e.g. Land Use Ordinances, CIP

The BWS's eight Watershed Management Plans (addressing the resource of water) feed into the eight reciprocal regional Development Plans and Sustainable Communities Plans (addressing the use of water). Since there is connectivity between water and land use, the two plans are updated in tandem.

The 2035 population percentages set forth by policy in the General Plan for each Land Use District are as follows:

Waianae	4%	East Honolulu	5.3%
Ewa	13%	Ko'olaupoko	11.6%
Central	17%	Ko'olauloa	1.4%
Primary Urban Center	46%	North Shore	1.7%

A directed growth policy drives the larger percentages of population growth to south O'ahu – the Primary Urban Center, Ewa, and Central O'ahu. This policy protects rural areas like Waianae, North Shore, and Windward from development and helps contain the costs for new infrastructure.

Calculating water demand for agricultural uses

Barry explained that diversified agricultural water demand is estimated by multiplying the number of acres planned for cultivation by the average water demand per acre (currently: 3,400 gallons per day

per acre for diversified agricultural land and 2,500 gallons per day per acre in areas supplemented by rainfall).

Diversified agricultural water demand is expected to grow as additional acres are cultivated. There are large tracts of agricultural lands in the Central O'ahu, North Shore, Ko'olauloa, Ko'olaupoko and Waianae districts. Diversified agricultural water demand for the Ewa district is higher now than is planned for the future because the Ewa Development Plan includes conversion of agricultural lands to urban uses so some farmers are and will be moving toward Central O'ahu and North Shore.

Diversified agricultural water demands, current and future, were shown as follows, citing millions of gallons per day (mgd):

District	**Current Agricultural Water Demand** (2010-2015)	**Future Agricultural Water Demand** (2030-2035)
North Shore	24.2	29.3
Central O'ahu	15.8	15.7
Ko'olauloa	14.5	17.4
Ewa	7	4.7
Ko'olaupoko	4.2	6
Waianae	2.3	2.4
Total	**68.0**	**75.5**

The 2004 Agricultural Water Use Development Plan estimated that, of the 49,500 acres of prime agriculture lands on O'ahu, 11,000 acres are in monocrop cultivation. The remaining 38,500 acres are idle and available for cultivation.

Calculating water demand for BWS customers

The current (2010) total water demand for the BWS customers on O'ahu is 145 mgd. Barry described how the BWS estimates water demand for residential use.

- **Average Water Demand** = population served x average water demand per person per day. The BWS population served is calculated from census and Department of Planning and Permitting projections of resident population, and accounts for residents absent and visitors present, called *de facto* population. The BWS subtracts military populations and communities that have private water sources, to arrive at the population served by the BWS.
- **Most Probable Future water demand** (153 mgd) is based on continuing the current conservation trajectory. It is important to note that the continuation of this conservation trajectory may require new advanced conservation programs.
- **High-Range Future water demand** (166 mgd) assumes less water conservation per capita than in the "most probable" projections. Forecasts of water demand are used in analyzing water availability and infrastructure capacity.

Future BWS Water Demands (mgd)

Areas	Current	Most Probable Future	High-Range Future
Primary Urban Center	67.5	68.7	74.5
Ewa	18.7	26.8	28.2
Central Oʻahu	17.2	19.8	20.8
Waianae	9.7	8.9	10.6
North Shore	3.4	3.3	3.8
Koʻolauloa	1.2	1.5	1.4
Koʻolaupoko	18.3	15.9	18.3
East Honolulu	8.9	8.6	8.9
TOTAL	**144.8**	**153.3**	**166.4**

Barry explained that additional water demand calculations are considered when sizing the water system infrastructure, so when people turn on the spigot, water comes out. The WMP team is determining the following:

- **Maximum Day Demand** - high water use during the hottest summer day.
- **Peak Hour Demand** – demand during the few hours when water use is highest on the hottest summer day. (Usually, this is about twice the Maximum Day Demand.)

Trends Affecting Water

Barry described trends affecting Oʻahu's water supply.

Trend #1 - Decreasing Water Demand

Oʻahu's potable water demand dropped 10% from 1990 to 2014. The BWS attributes the decrease primarily to conservation. Demand in 1990 reached a high of 155.57 mgd. By 2014, demand dropped to 139.13 mgd.

In the late 1980s, Oʻahu water system was reaching capacity, but then several things happened:

- The economy went flat and the Japanese development bubble burst.
- The BWS Water Conservation Program ramped up in 1990.
- Oʻahu Sugar Co. closed in 1995, freeing up unused agricultural water for new potable water sources, which BWS developed.

The BWS Water Conservation Program has been very successful, including:

- In 1993, the City Council approved a low-flow toilet ordinance.
- A limited time (approximately 10 years) $100 rebate for installing low-flow residential toilets was offered by the BWS in collaboration with the Department of Environmental Services.
- In 2003, the BWS's Honouliuli Water Recycling Facility started producing recycled water for irrigation and industrial processes, freeing up potable water for other uses.
- In 2005, water rates were increased for the first time in 11 years. At the same time sewer rates were increased to meet the EPA Consent Decree to convert Sand Island and Honouliuli WWTP's to full secondary treatment. This economic incentive contributed to customers better tracking and reducing their water use.

The trend of decreasing water demand has been as follows:

- 1990 187 gallons per capita per day (gcpd)
- 2000 180 gcpd
- 2010 157 gcpd
- 2035 145 gcpd (projected approximation)

Conservation trends have a saturation point. Early efforts usually capture those water savings that are simpler and lower cost. The BWS anticipates that reductions in water use will continue, although at a lower rate. This is the basis for the Most Probable Future Water Demand forecast.

Trend #2 – Transit-Oriented Development (TOD) Will Drive Demand Along the Transit Corridor

Barry showed a map that illustrated one example of directed population growth. Kaka'ako is a major growth area undergoing high-rise development; 4,300 new residential units planned around the Kaka'ako Station will increase water demands. Many of the pipelines in Kaka'ako were installed in 1930-40s and are reaching their design life. Barry showed map of main breaks in the Kaka'ako water system.

The CIP will recommend replacing a number of pipelines, including many that will be stressed by TOD. The BWS has asked some large developments, including developers in Kaka'ako , to help bear the cost to replace the aging pipelines fronting their projects, given the additional stress the people in their developments will put on the system.

Trend #3 – Hawai'i's Climate Is Changing

Another major trend impacting water supply is climate change, which is being researched and studied.

According to Dr. Chip Fletcher, at University of Hawai'i-Manoa (2011), in Hawai'i:

- Rainfall and stream flow have decreased.
- Air temperature is increasing.
- Rainstorm intensity has increased.
- Sea surface temperature is rising
- The ocean has grown more acidic.
- Sea level is rising.

Barry told the group that there has been less rainfall in the state over the past 100 years. However, the rate of rainfall decrease has accelerated over the last 3 decades, for all islands except Lanai. Researches note that the they do not know if the decreasing rainfall is in fact a trend or just a downward segment of a longer term cycle that will level off and increase in the future. BWS needs to still plan for this climate change uncertainty.

Less rainfall means decreased streamflows, reduced recharge to aquifers, and a changing environment to consider.

QUESTIONS/ANSWERS

Q. Do peak pumping rates occur at the same time as peak demands, or does the pumping rate remain consistent throughout the day? How are energy costs correlated?

A. Most peak demand is met by storage in reservoirs. In town, there isn't enough storage so certain pumps are used. But, in most of the systems, peak demand can be met by elevated reservoirs. Demand fluctuates throughout the day.

Q. You've asked some developers to participate in paying for redoing the piping. Will this become mandatory at some point?

A. This is done on a case-by-case basis. Whenever a developer comes in and asks for a new meter, they pay a one-time impact fee, called Water Systems Facilities Charges. It pays for resource development, transmission and storage. Every development, large or small, pays this charge to help offset the cost of existing infrastructure or new systems that will be built as a result of that growth.

Q. Some members of the Chamber have a concern about how this would progress. It is easy to demonize the developer from the point of public sentiment. There will be some people who figure developers of multi-billion dollar projects can afford to rebuild pipelines. But not every developer can afford to do that. As we talk about the shortage of housing, if the developer that last touches the pipe has to pay for all of it, then that's going to be an added cost. There was a mindset when we first developed that many generations will use what was built and we all had to pay for it. But now, it's "I've got mine; you pay for it." It's a concern because in low-income rental projects, for example, how can developers be expected to pencil out the costs with the addition of paying for replacing pipes? It is something to consider.

A. The BWS wants to avoid an increase in water main breaks caused by aging pipes that weren't replaced along with the building of major developments. A lot of the large developments – e.g., most of Ewa – were built by developers, including the roads, drainage, sewer and water infrastructure. If you create a demand on the system, you have a responsibility to bring that up to a standard. Even if you were to renovate your house and added new water fixtures, you would be charged an impact fee. In that sense, the costs are applied across the board. There is an economic impact but it is equitably applied.

Water Availability and Supplies

Barry explained that the decreasing rainfall trend over the last 30 years is evident when annual rainfall amounts are compared:

- Wahiawa/Kahana/Punalu‘u dropped from 300 inches to 240 inches.
- Manoa/Palolo dropped from 150 inches to 120 inches.
- Mt. Ka‘ala in Waianae dropped from 100 inches to 65 inches.

Where the rain falls is where the streams flow. Barry showed a map with streams overlaid on the four major agricultural ditch systems serving State Agricultural District zoned lands:

- Waiahole Ditch (15 mgd) is supplied by groundwater tunnels in the Ko‘olau mountains.
- Wahiawa Ditch (20 mgd) is supplied by Kaukonahua Stream, Wahiawa Reservoir and combines R-1 recycled water from Schofield and Wahiawa Wastewater Treatments Plants.
- Waimanalo Ditch (1.5 mgd) is supplied by stream diversions in Maunawili Valley and Waimanalo Well I.
- Kamehameha Schools’ Punalu‘u Ditch (7 mgd) is supplied by a stream diversion.

Based upon projections for water needed in 20 years, an additional 7.5 mgd will be needed for agriculture. There is available capacity in the Wahiawa and Waiahole ditch systems to provide this water for agricultural growth.

An Example of Water Conservation and Environmental Sensitivity

Barry talked about what the Kamehameha Schools did to make the Punalu‘u Ditch system more efficient, taking only the water that is needed and leaving the rest in the stream for habitat and other uses. Often, an entire stream will be diverted to provide water for a particular use. Once the needed amount of water is used, the rest of the flow is discharged into other downstream areas, typically resulting in a large water loss and causing impacts to the stream. To avoid such waste, the Kamehameha School renovated their Punalu‘u Stream diversion by redoing the entire dam and piping the ditch. A grated intake diverts only what is needed for irrigation, leaving the remainder in the stream. This not only significantly reduces water losses, it pressurizes irrigation systems and decreases ditch maintenance costs.

Two fish ladders were added on the edges of the dam, to allow migration of o‘opu recruits past the diversion for spawning. The ladders are designed so they do not work for invasive species. An astronomical clock device closes the diversion at dusk, when o‘opu larvae float down the middle of the stream and when there is no need to draw water.

What Kamehameha Schools did with the Punalu‘u Ditch is a water conservation, cultural and environmentally sensitive model for other ditch systems throughout the State.

BWS Water Conservation and Streamflow Restoration

The BWS’s successful conservation and water loss control efforts have helped restore Windward stream flows. The BWS’s Windward source production decreased by 38% from 1990 to 2014, from 24 mgd to 15.5 mgd. Decreasing production means more water stays in the aquifers for drought storage and results in stream restoration.

The dike aquifers of Ko‘olaupoko, Waimanalo and Kahana are affected by water use. These dike aquifers interact with the streams. Stream flows can decrease with increased groundwater withdrawals. Reduced water use – conservation -- allows more Windward stream flows to support

agriculture, habitat in streams and nearshore waters, as well as native Hawaiian traditional and customary water rights associated with surface water.

Where the rain falls also is where aquifers store groundwater. Barry showed a map with the major aquifer systems on O'ahu. Each aquifer has a mathematically calculated sustainable yield. Currently, half of the total sustainable yield is pumped. Some related facts include:

- The sustainable yield for all O'ahu totaled 407 mgd in 2010, not including the Waiahole Ditch.
- Permitted use totaled 294 mgd in 2010 (not including Waianae, which is not a "Designated Water Management Area").
- Pumped groundwater totaled 190 MGD in 2010.

By inspection:

- Honolulu's water use is close to sustainable yield.
- Pearl Harbor has available sustainable yield from the closing of the O'ahu Sugar Co. in 1994. Diversified agriculture uses a lot less water per acre than sugar.
- There is available sustainable yield in Central O'ahu, North Shore and Ko'olauloa for additional agriculture since the City General Plan does not plan major urban growth there.
- The sustainable yields in Waianae and Windward (Kahana, Ko'olaupoko and Waimanalo) are not readily recoverable due to the many dike systems. The BWS's exploratory wells in these areas experienced low yields or impact streams.

According to the Hawai'i Commission on Water Resource Management (CWRM) in 2010:

- The BWS drew the largest amount of groundwater on O'ahu.
- Military drew the 2nd largest amount of groundwater.
- Third largest was agriculture, which uses mostly surface water and supplements with groundwater and includes the Waiahole Ditch.
- Fourth largest was irrigation for urban uses, such as golf courses, common areas and some residential areas.

Groundwater meets nearly all of the BWS's current demands (93.2%). The BWS also supplies water from brackish wells (1.4%) and recycled water (5.4%) for irrigation and industrial process needs.

Currently, the Average Day and Maximum Day Demands are used to assess water system capacity (pumps, pipes, reservoirs and treatment systems). The BWS's calculations show:

- The Most Probable Future Maximum Day Demand (153 mgd) is within the BWS's pumping capacities (that is, system capacity is adequate).
- However, the High-Range Future Maximum Day Demand projection (166 mgd) *could exceed* the pump capacities in select water systems before 2035 (that is, demand exceeds capacity).

QUESTIONS/ANSWERS

Q. Is the BWS watching new Federal Food Safety Guidelines and how they will affect water supply for agriculture? Surface water will not be permitted for irrigating food crops. If you're growing

something like lettuce, it grows low to the ground and touches the water. There may be fecal matter and other things in the surface water, so its use will be prohibited.

A. At the North Shore, there has been an increased interest in agriculture water meters. One large farm that grows organic greens (Ma`o Farms) recently came in for a couple of potable water meters. The new guidelines need to be taken into consideration with respect to agricultural water demand forecasting. Agriculture water use from the BWS system constitutes about 3% of the total water produced. That could increase due to the changes in regulation you described. So thanks for that information.

Q. Why are you permitted to pump more than the sustainable yield in Honolulu and why isn't there a permitted amount in Waianae?

A. Waianae is not a Designated Water Management Area. That's why there isn't a permitted amount. All of the other areas on O'ahu are designated. Common law rights apply to Waianae. State Water Code applies to the rest.

Honolulu is another matter. In 2008, the CWRM decreased the sustainable yields shown in their Water Resource Protection Plan. That affects the water system infrastructure. The CWRM may cut sustainable yields further. Waimalu could be reduced as well. Hopefully the adjustments to sustainable yields will be a fair and scientific process through an abundance of expert consultation.

Q: Does the BWS charge as much for agriculture water as for home use? We want to encourage agricultural growth. Do you give the farmers a break? Could you supply more?

A. In the current rate structure, agricultural customers pay the same as residents for the first 13,000 gallons per month. Beyond 13,000 gallons in a month, they pay $1.89 per 1,000 gallons, which is a reduced rate. Large farms are encouraged to use private groundwater wells, recycled water, or other alternative water supplies. If the number of small farms starts to increase, the BWS will have to look at ways to take that into account. It could become challenging if increasing agricultural demand required so much water that there would not be enough capacity for other uses.

Board of Water Supply Planning Principles

- Operate within sustainable yields.
- Move water from where it is to where it's needed; take only what is needed, without causing harm; and don't waste it.
- Develop new groundwater sources for growth and reliability.
- Plan for sufficient water for agricultural uses.
- Diversify supply to address uncertainty (e.g., climate change).
- Monitor trends and adjust as necessary.

Barry briefly explained a map that showed how much water is expected to be transferred in the future throughout the interconnected water system. In 2035, water demands are forecasted at 153 mgd island-wide. Water transfers between land use districts will be needed. The 2035 water demand forecast includes 2.0 mgd of desalination in Ewa.

2035 forecast *Shown as mgd*

District	Estimated yield	Estimated demand	Planned water transfer
North Shore	2.9	2.9	NA
Central Oʻahu	40.3	19.6	7.5 to Primary Urban Center +13.2 to Ewa
Koʻolauloa	6.7	1.9	4.8 to Koʻolaupoko
Koʻolaupoko	10.9	15.6	0.15 to East Oʻahu
East Oʻahu	1	8.5	NA
Primary Urban Center	68.1	68.2	7.4 to East Oʻahu
Ewa	19.1	27.6	4.7 to Waianae
Waianae	4.2	8.8	NA

The BWS takes a holistic view of transferring water. Planning water sources explicitly considers agricultural needs and protection for streams that are impacted by pumping.

Barry noted that the State's estimates of sustainable yield could change over time. Hydrologic data are updated periodically. Water levels of important basal aquifers are tracked, as are water quality data. Groundwater models are adjusted with the new information to estimate the sustainable yield.

Addressing Uncertainties

The Water Master Planning process includes identifying and addressing uncertainties like climate change, demand forecasting, and new and alternative sources of water. Primary climate change adaptation strategies include:

Continued Climate Research, which includes:

Work being done by the University of Hawaiʻi:

- Climate model to forecast rainfall trends to 2061. Is rain going to increase or decrease? Where?
- Quantification of the contribution of cold-front generated rainfall. How much of the decrease in rainfall is because of storms on the Leeward side?

Work being done by the United States Geological Survey:

- Update Oʻahu recharge estimates and the groundwater models for Pearl Harbor and Honolulu.

Work being done by the Water Research Foundation:

- Identify water sources and systems vulnerable to severe drought and coastal inundation. Pipelines along the coast may be vulnerable, and our plan would be to harden them or otherwise make our system more resilient.

Enhanced Watershed Management

Barry said that the BWS emphasizes enhanced watershed management, which includes:

- Focused investment in priority watersheds that sustain drinking water sources.
- Increasing directed funding to watershed partnerships (Department of Land and Natural Resources, Koʻolau and Waianae Mountain Watershed Partnerships, Oʻahu Invasive Species Committee) where our water resources are.
- Evaluating aquifer storage and recovery potential for storm water impoundment in Nuʻuanu Reservoir No. 4. to recharge the Kalihi and Nuʻuanu aquifers. We could treat the water and inject it into the ground. That would supplement natural aquifer recharge from watersheds.

Supply Diversification

Other approaches are available for the BWS to keep pace with growing water demand and reduce impact to the existing system, including:

- Advance conservation programs to reduce demand and "free up" existing water-system capacity.
- Expand centralized and distributed recycled water systems in areas with limited groundwater, to mitigate drought.
- Pursue limited brackish and seawater desalination in Ewa to support growth, mitigate drought and reduce groundwater transfers from other districts.
- Investigate renewable energy systems and energy efficiency improvements for pumping and treatment plants.

New Groundwater Sources

With consideration of the uncertainties in demand forecasts, decreasing sustainable yields and climate change, the BWS has identified a combination of 22 additional groundwater wells and alternative sources that can help with climate change adaptation over time. The BWS has installed most of the wells for current and future growth, with an estimated yield of 48.9 mgd. Additional permitted use is needed for a portion of the sources (18.3 mgd).

The BWS has identified a total of 68.5 mgd of alternative sources (BWS, State and private) that will serve to diversify Oʻahu's water system for urban and agricultural demand. Desalination and recycled water projects have been identified for future growth in Ewa. Recycled water sources, existing and planned, provide additional irrigation supply and reduce the use of groundwater, to be conserved for drinking water purposes.

Summary

Conservation has reduced the amount of water supplies and infrastructure needed, and this effort must be continued. Otherwise, more water sources will be needed, which means added infrastructure costs.

Currently, there are adequate water supplies for both agriculture and urban growth, island-wide.

Water supplies aren't always available where they are needed, so transfers between regions will be necessary. However, the BWS will move only the amount that is needed, without causing harm or wasting the water source.

Conclusions

To address uncertainties in demand forecasts, decreasing sustainable yields and climate change the BWS needs to:

- Add new sources to meet growth and reliability needs
- Diversify supplies
- Meet local demands, e.g. Ewa
- Mitigate climate change impacts

In the WMP, the BWS will determine: how much, how fast, what types of projects and at what cost?

QUESTIONS/ANSWERS

Q. When you say: "develop groundwater sources", does that mean drilling new wells?

A. Yes.

Q. When you look at coming up with new sources, how do you decide between R2 and R1 recycled water? For example, Central O'ahu may not have agricultural water needs, but R2 can be used for irrigation and other things instead of potable water.

A. The BWS prefers R1 recycled water. It is more highly treated and meets more stringent standards than R2 recycled water. There are many benefits to using R1 water directly, and that's where the BWS wants to take it. R1 water is recycled water that has had a significant reduction in viral and bacterial pathogens and is permitted for use on all vegetable crops. R2 is disinfected, secondarily treated recycled water but has limited applications.

Q. Does the BWS have a "break even" water rate? How do you know your rates cover the costs of water?

A. The BWS performs internal audits to make sure it's meeting revenue requirements. There are so many different types of customers that there is no single "break even" point. Right now, the BWS rate structure provides enough revenue for its current CIP and operations and maintenance. If stakeholders want to see programs expanded to increase conservation and watershed management, the Stakeholder Advisory Group can address that when we begin discussing the Financial Plan and water rate study.

Ernest Lau said that when the Stakeholder Advisory Group begins the rates process, the Water Master Planning team will explain in detail how the rates work. One of the first things the BWS does when establishing rates is determine the cost of service for each of the customer groups: residential, agriculture, non-residential, military, and others. From there, policy decisions can come forward, like: *Do we want to have lower rates for people of low income? Do we want to subsidize agriculture? What do we want for our rate structure?*

WATER CONSERVATION

Barry Usagawa said the BWS Water Conservation Program has five programmatic areas.

Leak detection, repairs, and maintenance addresses water loss in the BWS system. This program is about getting water from the source to where it's needed as efficiently as possible with minimal loss. The BWS's goal is to have only 10% water loss or less. Current water loss is in the range of 12% - 13%, so there is more work to be done.

Large water users, which includes local plumbing and conservation codes, water audits, and partnerships like the green business program.

Regulatory programs include drought plans, low groundwater plans to reduce water use to protect sources, as well as low-flow fixture requirements.

New conservation opportunities include recycled water, stormwater impoundment, similar to Nu'uanu, and rain barrel catchments.

Education and outreach, run by the BWS Communications Office, is a robust program that includes tours, special events and workshops at the Halawa Xeriscape Garden (event schedule was included in stakeholders' meeting packets), guest speakers, and tips for saving water.

QUESTIONS/COMMENTS

- **The Girl Scouts have a year-long water conservation program called "World of Water". This could be a partnering opportunity.**
  A. The Girl Scouts have not yet approached the BWS, but the Communications team will look into it. The BWS's poster and poetry contest that has been running for 35+ year. Children who participate in the contest become water-conserving adults. The BWS wants to educate people when they're young. In turn, the children educate their families at home.

Public Service Announcements (PSAs) 15-Second Spots

Every summer, the BWS launches a water conservation public service campaign as part of the education mission. The campaign runs in the summer because that is when water demand is highest. These new spots are the first ones produced in over a decade. There are four 15-second spots. They are animated and use humor to capture attention.

Feedback:

- **In the middle two PSAs, the water appears to be having too much fun. It looks like we're having a blast if we turn faucets/hoses on and let them run.**

- **Every PSA ends with "To learn more, go to the BWS website". Do you know if people are visiting the BWS website in response to this message?**
  A. The spots just started running in early July. The BWS has a whole page on the website about water conservation, including tips to conserve. The PSAs are supposed to point the public to the website so they can learn more. The BWS also takes water conservation to the community, going to fairs and other events, and runs the poster/poetry contest annually.

- **Is the BWS doing anything with schools?**
  A. Yes, upon schools' requests, the BWS gives public tours of the Honouliuli recycled water facility and the Nu'uanu dam. The BWS's education program corresponds with the Department of Education's study of water curriculum for 3rd graders. Also upon request, the BWS speaks to college classes. We have a very good outreach to the education system.

- **Will there be an opportunity for the Stakeholder Advisory Group to tour the Nu'uanu reservoir and other BWS facilities to get a fuller picture of what we're talking about?**
  A. Yes.

- **Utilization of websites has been dropping with the use of mobile devices. Is there a way to include in the PSAs a message that has people text a number and have someone text them back with a list of things they can do to save water? The information would be more directly targeted about what they can use.**
  A. That would be a great idea. The BWS is in the process of updating its website be more interactive.

- **Is there any correlation between when the PSAs start running and the website traffic? Is there any way to gain metrics around the campaign to determine whether or not it's working?**
  A: The communications team can check web traffic and will find out if it's possible to track traffic specifically to the campaign. The BWS is using other social media tools, e.g. Instagram to promote this year's plant sale, hoping to attract a younger demographic.

- **What market segment did you target? In some districts, many are seniors who don't have website access. They don't necessarily listen to TV or radio.**
  A. For this event and this campaign, the BWS is targeting a younger demographic. Research shows that older people are using Facebook. The BWS uses Facebook, Twitter, and Instagram as our social media channels to reach a broad spectrum of public.

- **Is the Department of Education's program described on the BWS website? Do you do anything like Hawaiian Electric Company's energy reduction challenge? Kids get awards for results that can be tracked through energy usage. This is action oriented rather than information oriented. Kids could educate their parents to take shorter showers or other actions that promote water conservation.**
  A: The closest to the Hawaiian Electric Company's energy reduction challenge is the island-wide poster and poetry contest. This year the BWS received 1500 entries just for posters. The

submittals from kids are just amazing. Winning entries are featured in a calendar that is widely distributed.

- **Blue Planet Foundation research indicates the average household spends less than 6 minutes per year looking at their energy bill. What is that for water? How many minutes do people spend looking at their water bill? If there is familiarity that conservation = money, maybe the concept should be introduced at the school level. Maybe there is a challenge or reward that makes this learning more action-based.**
  A. There are apps that can be used to calculate the water footprint for your house. The BWS's Communications Team would like to get to the point where education can be more interactive, using smart phones and a water app.

- **That would be great. I'd like to see that in the BWS's budget.**

Stakeholder Input re: Conservation

A series of questions about water conservation had been sent to stakeholders in advance of this meeting. Dave Ebersold facilitated a discussion of the first two of five questions.

Question 1: Conservation Insights from Stakeholders' Areas of Expertise

Changes in technologies and practices led to water conservation successes in Hawai'i and nationwide. Each of you represents an area of interest with respect to water – restaurants, agriculture, travel/tourism, industry, development, etc. Please advise us on what you see on the horizon with respect to water conservation and your area of work or interest or location on O'ahu. What's coming? What's needed? What impact might it have on planning for water 30 years from now?

Responses, ideas, and questions included the following:

- Take a look at the reclaimed water systems and make sure they're all coming up to a level of R1 standards where water is usable for landscapes, golf courses, lawns, etc. We should be able to use gray water for lawns at homes.

- There is concern that recycled water plants are not being overseen as much as they should be. A look at what happened in the last few storms (e.g. sewer spills) demonstrates that these plants should be more accountable. Who runs these plants – city, state, or others? Because we are on an island, oversight and accountability are very important. For the future of water, we can't keep polluting the oceans. We need to protect the ocean around us, as well as people; we need to protect all life.

- The aging population is increasing. By 2030, we will have nearly doubled the number of people over 65. That doesn't mean something specific to water except that when people retire and begin living on limited income, they often lose opportunities to continue to accrue resources. So, when you're looking at the future of water, you have to think of water for people who will be on fixed incomes.

- In conjunction with that, the people immigrating into Hawai'i from other states tend to be mid-life or older, and that can be another impact.

- PSAs can address certain things about wasting water. One example of water waste is in restaurants. Servers repeatedly refill water glasses without being asked. Another example is people allowing water to run and run from faucets in public restrooms and at home. The PSAs could show an ordinary person doing things that should be corrected. The new BWS ads are very sophisticated, but we have yet to see if they will make an impact on the people who have wasteful behaviors.

- What is the possibility of resurrecting the low flow toilet incentive program, particularly targeting older neighborhoods that may not have participated in the earlier program?

- With the recent wet weather we've had, a vast amount of fast-moving water has rushed through valleys directly into the ocean. Specifically, rainwater rushing through the Kamilonuli Valley goes directly to the marina and into the bay. From a resource standpoint, what is needed would be to understand the dynamics of that last undeveloped valley. Maybe there are resources there that might be needed. Nobody has ever done any studies there.

- There is a lot of interest from younger people around sustainability. Plumbing codes do not allow for gray water reuse. They don't allow a lot of water-conserving things that a lot of people would want to do around their house. Is there a way to update the plumbing codes? We're operating on codes from around 2006. Updated plumbing codes could have a huge impact.

- It takes about 2 minutes to get hot water circulated in the house. That's a lot of water that just gets wasted down the shower drain. Is there some technology or education about something we should buy to update our plumbing so that we're not wasting all that water?

- There's a hot water recirculation pump. It costs about $100. Install it at the furthest point from your hot water heater and it keeps hot water circulating through your house. Then all that water isn't wasted. That be would good for an incentive.

- Use a bucket to catch the cold water while the shower water warms up.

- Developers are required to put in storm drains so that storm water goes out to the ocean. That contributes to our brown water. Why don't we require developers to put in reservoirs, especially in places like the Koa Ridge and Hoʻopili developments that are close to agricultural land? Put in reservoirs. Send storm water to the reservoirs where it could be used for agriculture rather than flow out to the ocean and pollute our waters.

Question 2: Potential for Developing New Incentives from Stakeholders' Areas of Expertise

Incentives drive change. Utilities often create incentive programs to get customers to change to more efficient, more conserving use of resources. Please advise us on new incentives you would like to see, and tell us why you think they are important.

Responses, ideas, and questions included the following:

- The hot water recirculation pump.

- Resurrect the low flow toilet incentive program.

- A very smart BWS engineer once said that 50% of water use is for landscaping. A credit for catchment – e.g., rain barrel to direct water off the roof -- or using gray water to irrigate your yard, would be a good incentive.

- Do we already have incentives for time of use? For example, could there be an incentive to water lawns at times when demand is typically low?

    A. Current rates are structured without regard to time of day water is used. If the BWS decides to switch to smart metering, there may be an opportunity to pursue incentives based on time of use.

- Have a water conservation contest in the schools and have schools compete for the best ideas; give them big prizes.

- We have a path for incentives laid out for us by utilities. Incentives were offered for installing and/or upgrading solar systems. What followed was an explosion of new solar systems. New light bulbs were offered to get people to convert and save energy. We've never reached that level in the water industry. Our incentives have been for low flow toilets and fixtures, and for dropping tablets into toilets to reveal leaks. If we got up to the point where we're offering tax credits for low flow fixtures, more people would be willing to adopt them.

- Is a European style toilet (dual flush) better than a single flush 1.3 high-efficiency or 1.6 low flow toilet? Could the BWS offer an incentive for replacing old toilets with different types that are now available – dual flush, high efficiency – in addition to the low flow models?

    A: Earlier models of single flush high-efficiency toilets weren't great. They're getting better now. The EPA has a Water Sense program and good information can be found on their website. Maybe doing a more directed incentive program makes sense now. The water sector can learn a lot about incentives from Hawaiian Energy and the energy sector, and from organizations like Blue Planet Foundation. There are also other, special design incentives for bigger water users, like hotels – for example, incentives to convert to a different type of cooling towers that conserve water. Is there a way to incent some of our larger water users and help get them over that initial capital investment for major water conserving systems so that the payback is more reasonable?

- A toilet-lid faucet saves water and is easy to install. (See photo of an example below.)

These are common in Australia and Japan, cost about $100, and would be a good incentive.

- Do we know if County and State offices lead by example by not watering between 9 a.m. and 5 p.m.?
  A. The BWS sends letters at the beginning of every summer season asking the Mayor to request the various departments to adhere to the proper water scheduling.

- Neighborhood Boards could pass a resolution to ask the City/County offices to adhere to the recommendation to not water between 9 a.m. and 5 p.m.

- Right by the stadium on Moanalua Road, sprinklers were on right after 2 weeks of rain!

- Landscape architects can encourage planting plants that don't need a lot of watering. Another incentive would be timers with sensors in the ground that would modify the irrigation schedule if enough rain had already done the job.
- There are so many things that we can do to incentivize people. A lot has to do with informing people. There are Home and Remodeling shows. The BWS could be there with a booth and talk about ways to reduce water bills and have samples of water catchment, low flush toilets, etc.

- Another incentive would be to certify homes as water conserving. There are already certifications for "green homes", but there could be certifications for a home being water conserving (e.g. high efficiency washing machines and plumbing fixtures, timers and rainfall sensors on landscaping irrigation systems).

- Who's going to pay for it and who will be assessed? Do the small things that rub us the wrong way actually produce the results we want? They often do not. What will be a wise investment that gives positive result?

- The AARP recommends building water conservation into shorter contracts. How common are private water companies here?

- A. There are a few contractors that maintain some private water systems on the island.

Because of the time, Dave Ebersold ended the conservation here and promised to resume the discussion at the next Stakeholder Advisory Group meeting in November.

In the next meeting, Stakeholder Advisory Group members will discuss pilot programs and research, business decisions necessary for making water conservation investments, as well as the Fresh Water Council Blueprint and what the BWS's role should be in implementing the blueprint. (A copy of the Fresh Water Blueprint was included in the meeting handouts.)

SUMMARY AND NEXT STEPS

Next meeting is on Wednesday, November 18, 2015 from 4:00-6:30 P.M.

The group was asked to refer to the handout of the 2016 meeting dates. Dave told the stakeholders that their attendance is incredibly important and each voice is much appreciated.

Dave also discussed scheduling an optional tour of the BWS's facilities, reservoirs, and said the BWS would welcome tour recommendations. He asked if there are times or days that would work well for the stakeholders and if they are interested in attending?

The group said they would be interested in having a half-day tour on a Saturday.

Stakeholder Advisory Group meetings scheduled for 2016:

Tuesday	January 12, 2016
Wednesday	March 16, 2016
Tuesday	May 17, 2016
Tuesday	July 12, 2016
Wednesday	September 14, 2016
Tuesday	November 15, 2016