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Report to the Thirtieth Legislature
2019 Regular Session

WATER REUSE TASK FORCE

Prepared by the

State of Hawai‘i Department of Health

In response to
House Concurrent Resolution 86 of 2018

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WATER REUSE TASK FORCE
REPORT TO THE LEGISLATURE

REPORT CONTENTS

I. PURPOSE

The purpose of House Concurrent Resolution No. 86 S.D. 1 of Hawai‘i’s 2018 Legislative Session (HCR86) was to request the Department of Health to convene a task force to identify barriers and solutions to expanding water reuse in the State of Hawai‘i. HCR86 describes the need for expanding water reuse based on recent findings raising concerns about long-term fresh water security in Hawai‘i. Members of the scientific community have documented troubling trends, including reduced rainfall and increased evaporation rates, that will only worsen as climate change persists. Rainfall has decreased 22% in Hawai‘i over the last thirty years, and the trends show increased incidence of drought and declining stream flows. Increased runoff, development, and population levels also generate a sense of urgency to safeguard Hawai‘i’s future and develop innovative solutions to ensure our water security. Increasing the amount of water reuse in Hawai‘i will alleviate these pressures on our drinking water supplies.

II. RESOLUTION REQUIREMENTS

HCR 86 requests that the Department of Health convene a Water Reuse Task Force (Task Force) composed of the following members:

1. The Deputy Director for Environmental Health Administration of the Department of Health, or the Deputy Director’s designee;
2. The Chairperson of the Fresh Water Council of Wai Maoli: Hawai‘i Fresh Water Initiative, or the Chairperson’s designee;
3. The Chairperson of the Board of Land and Natural Resources, or the Chairperson’s designee;

4. A member of the Commission on Water Resource Management other than the Chairperson of the Board of Land and Natural Resources;
5. The Chairperson of the Board of Agriculture, or the Chairperson's designee;
6. The Environmental Program Director of the Hawai‘i Community Foundation, or the Director's designee;
7. A representative from a public agency with permitting or implementation authority over wastewater;
8. A director-level representative, if the representative is willing to participate, from a county agency with permitting or implementation authority over water reuse in that county, to be designated by the Mayor of that respective county;
9. The Chairperson of the House of Representatives Committee with subject matter purview over Water and Land, or the Chairperson's designee;
10. The Chairperson of the Senate Committee with subject matter purview over Water and Land, or the Chairperson's designee; and
11. A representative from the Legislative Reference Bureau, who shall provide legislative drafting assistance, if the task force proposes any legislation.

The Task Force is also requested to:

1. Collaborate with other federal, state, and county agencies and private entities;
2. Review findings of how water reuse and gray water regulations are administered in other states, localities, and countries, and assess the feasibility of implementing similar regulations in Hawai‘i;
3. Examine proposed language for future regulation or policy changes in Hawai‘i; and
4. Identify and rank potential demonstration projects for water reuse in Hawai‘i.

III. TASK FORCE FORMATION

To enable the evaluation of policy changes or recommendations that increase water reuse, HCR86 required the creation of the Water Reuse Task Force made up of the members described in Section II. The Department of Health was requested to organize the Task Force, and they reached out to each representative through a letter of invitation. After invitations were accepted from the prescribed agencies, the Task Force consisted of the following:

1. Sina Pruder, Wastewater Branch Engineering Project Manager, Department of Health
2. Tim Johns, Chairperson of the Fresh Water Council of Wai Maoli: Hawai‘i Fresh Water Initiative
3. Jeff Pearson, Deputy Director, Board of Land and Natural Resources and Commission on Water Resource Management
4. Denise Albano, Special Assistant to the Chairperson, Board of Agriculture
5. Dana Okano, Program Director, the Hawai‘i Community Foundation
6. Barry Usagawa, Water Resources Program Administrator, Honolulu Board of Water Supply
7. William Kucharski, Hawai‘i County Representative, Department of Environmental Management Director
8. Lori Kahikina, Honolulu County Representative, Department of Environmental Services Director

9. Michael Miyamoto, Maui County Representative, Department of Environmental Management Deputy Director
10. Jason Kagimoto, Kauai County Representative, Department of Public Works Wastewater Management Division P.E.
11. Senator Karl Rhoads, Chair of the Senate Committee on Water and Land
12. Representative Ryan Yamane, Chair of the House Committee on Water and Land
13. Charlotte Carter-Yamauchi, Director, Legislative Reference Bureau

Three Task Force meetings were held at the Department of Health to share the intentions of the Task Force, present the status of water reuse in Hawai‘i, discuss an overview of reuse in other locations, and vet potential reuse strategies and reuse demonstration projects. Task Force members were requested to attend meetings, complete surveys as needed, share potential partners, and evaluate and rank policy recommendations.

The following report outlines the Task Force's finding and recommendations, including proposed legislation, and will be shared with Director of Health, Chairperson of the Board of Land and Natural Resources, Chairperson of the Board of Agriculture, President of the Senate, Speaker of the House of Representatives, Director of the Legislative Reference Bureau, Mayor of each county, Chairperson of the Hawai'i Fresh Water Council, and President and Chief Executive Officer of the Hawai'i Community Foundation as resolved in HCR86. This report includes:

1. A summary of the findings on how water reuse and gray water regulations are administered in other states, localities, and counties, and an assessment of the feasibility of implementing similar regulations in Hawai‘i **- Section IV & V**
2. A list of high-ranked potential demonstration projects**- Section VII**
3. A summary of proposed language for future regulation or policy changes for on-site water reuse in Hawai‘i **- Section VIII**
4. A list of additional recommendations for scaling water reuse**- Section IX**

IV. WATER REUSE OVERVIEW

Task Force Meeting #1 Summary: The first meeting described the goals of the Task Force, outlined the schedule for subsequent meetings, and provided an overview of fresh water and recycled water in Hawai‘i. With Hawai‘i's strong reliance on groundwater, decreases in rainfall patterns due to climate change, and growing populations, water security is increasingly being threatened. To help ensure fresh water security for current and future generations, the Fresh Water Initiative was developed to increase water security by 100 million gallons a day (mgd) by 2030. To reach this statewide goal, 30 mgd more water needs to be reused, 40 mgd needs to be conserved, and 30 mgd needs to be additionally recharged. This Task Force, guided by HCR86, is dedicated to helping Hawai‘i reach the 30 mgd goal for water reuse, which will require the collective support of a variety of agencies, organizations, and stakeholders. The Water Reuse Task Force was designed as a collaborative forum to discuss the barriers of water reuse and the solutions that could guide us forward. Per HCR86, the Department of Health is convening this Task Force, with Hawai‘i Community Foundation (HCF) assisting on facilitation and research. As part of Hawai‘i Community Foundation's research on water reuse, their consultant Dr. Bahman Sheikh was asked to share his research and findings on challenges and solutions with the Task Force. During this meeting Dr. Bahman Sheikh described the current status of water reuse in Hawai‘i compared to

other regions. Dr. Sheikh also described the quality of reclaimed/recycled water, possible applications, various research studies, and ultimately the safety of recycled water, which in regulated uses is comparable to any conventional source of water.

Water Reuse: Various countries are excelling at promoting water reuse. Japan has stringent requirements for new buildings to develop on-site water recycling, and Australia is leading in non-potable reuse after the Millennial eleven-year drought. In Israel, the agricultural industry depends largely on water reuse to yield all forms of crops, including produce intended for raw consumption. The Middle East region is also advanced in water reuse, and the oil-rich countries are much farther ahead in using recycled water equal in quality to Hawai‘i’s R-1 recycled water. As for the United States, Hawai‘i is fourth in the nation behind Florida, Arizona, and California with 18.3 mgd reported water reuse. The primary application for recycled water in Hawai‘i is irrigation for golf courses at 12.35 mgd (73%), followed by 1.74 mgd for industrial, 1.56 mgd for agriculture, 1.06 mgd for landscaping, and the rest for construction or other purposes. The City and County of Honolulu uses the most recycled water, followed by Maui, Kauai, then Hawai‘i County. Other states’ water reuse experience, regulations, and future plans can be used as examples on how to scale water reuse and increase the types of application of recycled water.

Public health and safety is the most important factor for water reuse, and the quality of recycled water required depends on the end use of the water. Studies have shown that crop yields when using recycled water are unaffected, heavy metals are tested at below the detection limit, and market research has shown a positive response to using recycled water for irrigation. Agricultural applications for water reuse are expanding, and the record of existing projects is helping to positively influence the risk perception associate with water reuse, along with it being endorsed by multiple medical associations. In 1994, a *Statement of Support for Water Reclamation* was released, endorsed by multiple agencies, proclaiming the safety of water reuse. No area needs to feel like a pioneer or test subject since water reuse has been successfully used and studied in so many diverse applications.

Benefits of Water Reuse: There are a variety of benefits to recycling. The following were shared by Task Force members:

- Water reuse is far more sustainable than seawater desalination
- The impact of climate change is reduced
- Provides security against drought
- As we increase agriculture production, having another water source for irrigation helps us take less from the potable water supply
- Reduces the need for fertilizers in irrigation
- Preserves potable supplies for potable uses
- Potentially increases aquifer recharge
- Increases stream flow
- Helps create a more diverse water source
- Reduces the use of injection wells
- Helps ensure enough drinking water now and in the future
- Protects the environment
- Modifies the wasteful use of a limited resource

V. WATER REUSE BARRIERS

Task Force Meeting #2 Summary: During the second meeting barriers for scaling water reuse were discussed, including solutions from other regions. Dr. Sheikh outlined the barriers that are

impacting water reuse in Hawai‘i based on research and interviews with key stakeholders. Solutions from other regions were also outlined to offer recommendations that might be fitting for Hawai‘i. With multiple impediments noted in the categories of regulatory, perception, financial, and infrastructure, this meeting helped recognize which impediments have the most potential for significant yield toward meeting the established water reuse goal. Based on the facilitated discussion with stakeholders in the room, the following impediments were noted as having the most potential for change:

- Perception: The belief that there isn't a water shortage in Hawai‘i nor is water security a critical problem.
- Financial: The high cost of treatment, distribution and storage of recycled water.
- Regulatory: Separate the need for backup disposal regulations from the definition of R-1 water. Potentially blend water or allow waivers or variances in regulations and relax regulations around ponding through implementation of best management practices. Work with Department of Health Clean Water Branch to loosen regulations. For graywater, allow simple graywater projects to proceed (without the need for a permit) under a certain daily volume and under a set of prescribed conditions.
- Demand: Determine what applications recycled water can be used for, especially since agriculture has decreased in the State. This would require an analysis of needs (e.g. a market study for each county).
- Building Momentum: In Maui it's been proven that mandated reuse helps get developers to include recycled water in plans. Consider regional non-potable plans and back-bone systems developed by departments of water supply to mandate developers to use recycled water for new developments. Additionally, consider using disaster preparedness as a driver to entice change.

Barriers to Water Reuse: The impediments to water reuse can be broken down into four main categories: regulations, financial, social, and infrastructure. Lessons learned from other regions for regulations include California's 2014 regulation for replenishing groundwater with recycled water which has resulted in four large-scale groundwater recharge operations in southern California injecting highly treated recycled water directly into potable water aquifers. For countering financial impediments, California is excelling at making recycled water more affordable through cost sharing for the construction of water reuse infrastructure, low-interest state revolving funds, subsidies, and grants to member agencies. Legislation in both California and Florida have helped make water reuse an integral part of their water systems. For social impediments, or perception issues, public outreach and education are key to shifting public attitudes on recycled water. To change the public's negative perception of recycled water and graywater, public outreach such as brochures, fact sheets, videos, campaigns, and school programs have been integral in locations such as San Francisco, parts of Arizona, and in the country of Jordan (an international leader in using close to 100 percent of its recycled water). Adequate exposure to recycled water can also shift the paradigm; the long-term increase in water reuse has been proven to develop more confidence in both potable and non-potable reuse projects. Changing the terminology can also impact perception; simply changing legislation language from 'reclaimed wastewater' to 'recycled water' helped change public discourse and paved the way for California's success at reusing water. Finally, solutions to infrastructure barriers can also be learned from examples in other locations. Salinity in wastewater is a common concern, and other cities solve this issue with repairing leaky

coastal sewers, lining sewer lines, separating inflow from salty interceptors, and timing the use of recycled water with tidal cycles.

VI. WATER REUSE OPPORTUNITIES

Task Force Meeting #3 Summary: Previous Water Reuse Task Force meetings discussed the status of water reuse in Hawai‘i, an overview of how water reuse regulations have been administered in other locations, potential strategies, the barriers to water reuse in Hawai‘i, and localized recommendations and demonstration projects that will help increase the production and usage of recycled water across the State. At the third and final Water Reuse Task Force meeting, participants discussed potential recommendations for legislation, regulations, institutions, and infrastructure. After discussions were had and key points were addressed, Task Force members were asked to rank the top recommendations based on the group conversation and their personal expertise in the field. The following list of 10 recommendations have been compiled based on the group's rankings. The recommendations that require legislation and are ready to be moved ahead as policies are listed as proposed legislation in Section VIII.

Reuse Recommendations: Based on the water reuse recommendations discussed and ranked in Reuse Task Force Meeting #3, the following top 10 recommendations were identified:

1. Establish mandatory recycled water use zones, within reasonable transport distances from major sources of recycled water. The existing Honolulu "Reclaimed Water Zone" would be an example to emulate and expand. Establish incentives for developers.
2. Upgrade Water Reuse regulations- Allow unrestricted irrigation with R-1 recycled water. Limit violation reporting of spills to larger volumes, repeated/recurring events, and those related to design flaws.
3. Allow groundwater recharge with recycled water for (a) barrier against seawater intrusion, (b) aquifer storage and recovery, and (c) indirect potable reuse.
4. Recharge aquifers with runoff and recycled water—coastal aquifers being a priority.
5. Provide for additional full-time positions at Department of Health, dedicated to water recycling regulatory matters and directed toward encouraging increased safe use of recycled water and graywater.
6. Explore waivers for R-1 backup disposal and storage.
7. Explore federal funding opportunities to provide local assistance to water recycling entities.
8. Mandate use of recycled water where available for golf course, landscape, and agriculture irrigation within designated recycled water use zones.
9. Upgrade Water Reuse regulations- Allow use of municipal delivered R-1 recycled water in individual residences for landscape and crops irrigation.
10. Upgrade Water Reuse regulations- Encourage uses of graywater with simplified permitting system. Encourage use of residential clothes washing machine effluent (simple graywater) for landscape irrigation on residential premises without the requirement of a permit.

VII. DEMONSTRATION PROJECTS

During the Task Force meetings, attendees were asked to share any potential reuse demonstration projects that could help promote the use of recycled water in Hawai‘i. The following ranked water reuse demonstration projects were considered to have the highest potential considering readiness, public outreach, job creation, visibility, partnerships, innovation, usability, and volume of water reuse. Once appropriate partnerships are formed, demonstration projects that are finalized will have funding requested during legislative sessions.

1. Launiupoko Park Gray Water Reuse: Maui Department of Water Supply is considering gray water use for Launiupoko Park in Lahaina using lavatory and shower water. The park is too far from Lahaina WWRF to use recycled water. Maui is considering graywater subsurface irrigation but feels it would not be as effective as spray irrigation. Right now, Gray Water Guidelines do not allow for gray water use for projects other than residential use.
2. Mililani WWTP MBR R1: 1.0 to 2.0 mgd capacity. City Department of Environmental Services (ENV) completed a feasibility study dated January 2000, proposing an updated engineering study, EIS and if feasible, with 30% concept drawings and RFP development for a design, build, operate, and maintain contract. Potential partners include City Environmental Services, BWS, City Department of Parks & Recreation-Central Oahu Regional Park, Castle & Cooke-Koa Ridge development, Waikele Golf Course, Mililani Town Community Association and Mililani peninsula farmers.
3. Kealakehe WWTP R-1: Kealakehe Waste Water Treatment Facility R1 upgrade project. Focus on marketing the R-1 water and management of the resource. Potential partners include DOH, DEM, and hotel and resort associations.
4. Wahiawa WWTP R-1 Backup Discharge: Wahiawa Wastewater Treatment Plant is capable of producing R-1 water and plans are to pipe R-1 directly to ADC lands, formerly owned by Galbraith Trust. An impediment is the restriction of any discharge to Lake Wilson, an irrigation reservoir. Back-up storage is required, but land is limited at the Wahiawa WWTP. A backup discharge alternative such as a NPDES permit for lake discharge during storms when lake water is already muddy (high turbidity) could allow ADC to get a permit to use R-1 recycled water.

Additional Demonstration Project Ideas: The following demonstration projects were discussed by the Task Force but did not make the top ranked for readiness and impact:

1. Onsite reuse at new housing developments.
2. Waimanalo WWTP to Farms Reuse: The treated effluent water at the Waimanalo WWTP (currently injected into the ground) would be reused at nearby farmlands for irrigation.
3. Kula cesspools to reuse: Convert to R-1 recycled water package plant and use recycled water for agriculture and/or landscape irrigation. Kula is currently served by septic tanks over a drinking water aquifer.

VIII. PROPOSED LEGISLATION

Based on suitability for legislation, readiness, and impact, the following recommendations will be proposed in the 2019 legislative session. These policies were developed from the recommendations listed in Section VI.

1. **Establishment of Water Reuse Zones and Mandate to Use Recycled Water**
   Counties and County agencies producing recycled water shall establish Mandatory Water Reuse Zones, prepare and update these zones on maps demarcating lands within reasonable transport distances from major sources of recycled water, and establish administrative rules defining applicability for existing and new developments. Counties and County agencies producing recycled water shall have the responsibility to establish Water Reuse Zones within their service areas by January 1, 2020. After January 1, 2020, new developments within Mandatory Water Reuse Zones having non-potable water demands shall be mandated to use recycled water if (a) the quality of recycled water (R-1, R-2, or R-3) is adequate, with proper management, for their intended uses, (b) recycled water system capacity is available, and (c) the cost of connecting, switching and using recycled water does not constitute an inordinate financial burden to the water user, as determined by the County agency responsible for producing and delivering recycled water. Economic incentives should be provided including but not limited to subsidized recycled water rates and connection fees, proportionate share agreements among multiple users to distribute costs to existing and future users over time, restricting the allocation of potable water for nonpotable/irrigation uses. Existing users of groundwater, surface water, and municipal water supplies within Mandatory Water Reuse Zones shall be given up to five years from January 1, 2020 to switch to use of recycled water if (a) the quality of recycled water (R-1, R-2, or R-3) is adequate, with proper management, for their intended uses, (b) recycled water system capacity is available, and (c) the cost of connecting, switching and using recycled water does not constitute an inordinate financial burden to the water user, as determined by the County agency responsible for producing and delivering recycled water. These mandates shall apply to agricultural, landscape, industrial, and urban users of non-potable water.

2. **Groundwater Recharge with Recycled Water**
   The Hawai'i Department of Health shall (date to be decided) adopt regulations for safe recharge and replenishment of potable groundwater resources of Hawai'i with highly treated recycled water—such as, for example, reverse osmosis, activated carbon, advanced oxidation—protective of the quality of ambient groundwater and the environment, for the purposes of (a) aquifer storage and recovery, (b) seawater intrusion barriers, and (c) indirect potable reuse. The Department of Health may use as a model the California regulations for groundwater recharge with recycled water adopted by the California Department of Public Health on May 30, 2014. Protections for groundwater quality would include, among others, a limit on the ratio of recycled water to conventional recharge water sources, and recharge recycled water quality limits on total organic carbon, nitrogen, and indicator constituents of emerging concern.

3. **Adoption of Regulations for Onsite Non-Potable Water Reuse Systems**
   By January 1, 2021, the Hawai'i Department of Health shall adopt regulations for onsite non-potable water reuse systems, based on the National Blue-Ribbon Commission for Onsite Non-Potable Water Systems' "A Guidebook for Developing and Implementing Regulations for Onsite Non-Potable Water Systems."[1]

[1] https://sfwater.org/Modules/ShowDocument.aspx?documentID=11586

4. **Request for Funding for Demonstration Projects**
   Once partners are determined and one or more demonstration projects are finalized, state funding will be requested for implementation. Demonstration project(s) will showcase innovation, include opportunities for public engagement and education, and will result in multiple benefits for the local community.

IX. ADDITIONAL RECOMMENDATIONS

Public Outreach and Education: Based on research into other locations, public outreach and education are critical to scaling water reuse. The following recommendations were discussed during the Water Reuse Task Force meetings to help spread awareness about water reuse and its benefits.

1. Establish water recycling demonstration sites, with easy public access, self-guided tours, explanatory plaques, and safety features. The water recycling center at the Honouliuli WWTP would be a suitable model to emulate. Candidate sites can include some of the following examples, or similar projects:
   - Honokohau Harbor- Hawai‘i Island
   - Kealakehe Wastewater Treatment Plant- Hawai‘i Island
   - A potential water recycling project at Natural Energy Laboratory of Hawai‘i Authority (NELHA)- Hawai‘i Island
   - Lahaina Wastewater Treatment Plant- Maui
   - Wailea (100% reuse)- Maui
   - Expand Honouliuli recycled water network into Hoopili Development- Oahu
   - Wahaiwa Wastewater Treatment Plant- Oahu
   - Kunia Storage Basin (14 MG Capacity)- Oahu
   - Cesspit districts conversion to decentralized water recycling centers
2. Begin and maintain a widespread public outreach/education campaign that could include radio, newspaper, television, brochures, videos, presentations, and curriculum at schools.
3. Provide forums for dissemination of accurate information about water reuse for Hawai‘i, including websites, newsletters, news releases, etc.
4. Initiate and maintain periodic public tours of water recycling facilities, including treatment and reuse sites.

Further Recommendations: The following recommendations were developed through the Water Reuse Task Force process but did not rise to the top 10 list when ranked:

1. Coordinate water reuse expansion efforts with the Department of Agriculture’s Agribusiness Development Corporation and ADC’s efforts to promote increased food production within Hawai‘i.
2. Upgrade Water Reuse regulations- Allow daytime spray irrigation with R-1 recycled water. There is a disconnect between the unregulated use of undisinfected stream water versus the regulated disinfected R-1 recycled water for irrigation.
3. Research and share water reuse funding opportunities including the U.S. Bureau of Reclamation’s Title XVI Water Reclamation and Reuse grant opportunity.

4. Explore a water-quality based approach to regulating onsite recycled water systems and for smaller neighborhood systems. Provide for continuous on-line water quality tracking for monitoring the end-point water quality, where daily testing is prohibitive of reuse.
5. Encourage and develop incentives for on-site water reuse in new high-rise buildings (commercial, residential, hotel, etc.), in clusters of high-rise developments, etc. within designated recycled water use zones.
6. Upgrade wastewater treatment to R-1 level or whichever level is allowed for the intended use of the water. Include treatment reliability requirements.
7. Establish food crop production facilities on lands previously growing sugarcane and pineapple and provide for use of R-1 recycled water for irrigation demands for most food crops, R-2 and lower quality recycled water for irrigation of other agricultural crops allowed by the 2016 Reuse Guidelines.
8. Change statutory language to remove "wastewater reuse" and "treated wastewater" and similar terms and replace them with "water reuse" and "recycled water" and similar terms.
9. Revise R-1 permit language: Use "reuse of R-1 recycled water" instead of "disposal of R-1 recycled wastewater."
10. Provide for a planned cessation of use of cesspits, cesspools, and septic tanks/leach fields within SWAP drinking water source capture zone delineations or adjacent to environmentally sensitive estuaries and nearshore waters. Require cesspit users to connect to sewers and/or provide for formation of special districts empowered to collect the required fees to construct and manage water recycling systems. Convert cesspool service districts to neighborhood-scale decentralized water recycling systems and reuse the effluent for non-potable applications.
11. Conduct triple-bottom-line (TBL) economic analysis of the costs and benefits of water reuse to the State of Hawai‘i
12. In light of court rulings, fines, and consent decrees, research opportunities to promote more widespread water reuse while simultaneously reducing sewage burdens on ecosystems.
13. Provide incentive payments, such as rebates, for graywater reuse facilities at residential, commercial, and multi-purpose developments. (Similar to solar rebate program).
14. Designate a water reuse coordinator for each county—a dedicated champion for increasing water reuse in each county and in the State of Hawai‘i.
15. (Water and wastewater agencies) join WateReuse Association as member utilities.
16. (Water and wastewater agencies) subscribe to Water Research Foundation.
17. Seal coastal sewers against seawater flowing into recycled water. Alternatively, replace leaky sewer lines with new lines at higher elevations in anticipation of future seawater rise.