

EXHIBIT "I-9"
PART Q

A Checklist of Water Conservation Ideas For



Golf Courses & Industrial Landscapes

This checklist provides water conservation tips successfully implemented by industrial and commercial users. This list has been revised from the original copy first published and distributed by the Los Angeles Department of Water and Power and the Water Efficiency Manual by the North Carolina Department of Environment and Natural Resources.

START A WATER CONSERVATION PROGRAM

- Increase employee awareness of water conservation.
- Install signs encouraging water conservation in employee and customer restrooms.
- When cleaning with water is necessary, use budgeted amounts.
- Read water meter weekly to monitor success of water conservation efforts.
- Assign an employee to monitor water use and waste.
- Seek employee suggestions on water conservation; put suggestion boxes in prominent areas.
- Determine the quantity and purpose of water being used.
- Determine other methods of water conservation.
- Conduct contests for employees (e.g., posters, slogans, or conservation ideas).

PLANNING AND DESIGN

- Consider the following:

- Physical conditions (drainage, soil type, sun/shade, etc.) and the use of the site (foot traffic, recreation, viewing, etc.)
- Creating shade areas, which can be 20 degrees cooler than non-shaded areas, decreasing evaporation.
- Grass areas only where needed; avoid small areas under 10 feet wide.
- Permeable materials such as porous concrete or permeable paving methods.
- Grading and directing surface run-off and rainfall gutters to landscaped areas as opposed to drainageways that exit the property.
- Incorporate high water demanding plants at the bottom of slopes, and maintain the use of existing trees, plants, and wildlife in the area during planning.
- Minimize the use of impermeable surfaces to lessen runoff and resulting stormwater pollution.
- Identify water source points.



- Develop a schematic of all water entry points (know where your faucets, time clocks, solenoids, booster pumps, sprinklers and bubblers are located).
- Identify capacity of each water-carrying unit and frequency of use.
- Determine specific use for each entry source.

➡ ANALYZE AND IMPROVE SOIL CONDITIONS

- Test the soil quality, nutrients and absorptive capacity, and then select plants based on findings. Adjust the pH level if necessary.
- Use organic matter (compost, mulch or manure) to increase the soil's water holding capacity. This helps improve water distribution and lowers levels of evaporation.
- When improving the soil of a given area, remember to treat a larger area around the planting to allow ample space for root systems.
- Prevent heavy construction equipment from compacting soil in areas around trees or other sensitive habitats.

➡ PLANT SELECTION

- Choose native, climate-appropriate species.
- Consider plants' water demand, pest tolerance, soil nutrient and drainage requirements.

➡ INTERIOR AREAS

- Discontinue continuous flow.
- Use ponded water where available.
- Adjust flows to reduce discharge of water.
- Install water-saving devices to decrease water consumption – restrooms (toilet dams and flappers), faucets (aerators), cooling systems.
- Use recycling systems for chillers and cooling towers.

- Consider installing energy-and-water-efficient air conditioning equipment.

➡ MAINTENANCE PROCEDURES

- Sweep materials from floor instead of washing down whenever possible.
- Instruct clean-up crews to use less water where appropriate.
- Check water supply system for leaks.
- Repair dripping faucets and continuously-running or leaking toilets.

➡ DESIGN CRITERIA FOR TURF AND LANDSCAPE AREAS

- Contact the Department of Water Resources or your local water supplier about possible landscape water auditor classes for your golf course managers.
- Hire a golf course and/or landscape architect with water conservation and xeriscape experience.
- Use turf only where actually necessary: Immediate picnic areas/outside lunch areas and golf course target areas (greens, tees, landing areas).
- Turfgrass should be cut to the maximum recommended height for its type (generally a minimum of two inches to a maximum of four inches) for most efficient water use.
- Limit or exclude turf from roughs.



- Use only low-water use plant material in non-turf areas.

- Drip irrigation and microsprays place water at the base of the plant. This reduces evaporation and saves water by not soaking the entire ground surface. This works for trees, shrubs, and groundcovers.
- Use automatic irrigation systems monitored by moisture probes (i.e. tensiometers), and rain shut-off devices to cut power off during rain.
- Design dual watering systems with sprinklers for turf and low-volume irrigation for plants, trees, and shrubs. Operate sprinkler system before sunrise and after sunset. Amount of irrigation can be determined by the evapotranspiration rate, which DWR can help you determine.
- Use properly-treated waste water for irrigation where available.

✚ EXTERIOR AREAS

- Regular aeration of clay soils will improve water holding capabilities and prevent runoff.
- Discontinue using water to clean sidewalks, tennis courts, pool decks, driveways, and parking lots.
- Make sure irrigation water does not run onto streets or into alleys. Adjust sprinklers to water only plants and not sidewalks or roads.
- Use the same size nozzle when replacement is needed. Sprinklers should be replaced with the same brand of sprinklers. Spray heads are aligned with grade.
- Replace worn spray nozzles.
- Regulate pressure properly for system demands.
- Make sure rotors or spray heads are mounted correctly. Replace with proper unit for the job.
- Post a current controller schedule inside the door of the controller.



- Check for leaking valves.
- Adjust the operating time (runtimes) of the sprinklers to meet appropriate seasonal or monthly requirements.
- Check plant leaves and take soil samples to confirm proper system functioning.
- Look into alternative sources for irrigation water (i.e. the use of wells as opposed to city water, water reuse operations from air conditioning condensate, storm water retention ponds, or cisterns, non-contact cooling water).
- Use dedicated water meters to monitor landscaping water use.
- Have a catchment/distribution uniformity test performed on-site to determine how evenly water is applied when sprinklers are in use.

For more information, contact:

**Maui County Department of Water Supply
Water Resources and Planning Division**

59 Kanoa Street Wailuku, HI 96793

Telephone: (808) 244-8550

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A Checklist of Water Conservation Ideas For



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➤ START A WATER CONSERVATION PROGRAM

- Increase employee awareness of water conservation.
- Install signs encouraging water conservation in employee and customer restrooms.
- When cleaning with water is necessary, use budgeted amounts.
- Read water meter weekly to monitor success of water conservation efforts.
- Assign an employee to monitor water use and waste.
- Seek employee suggestions on water conservation; put suggestion boxes in prominent areas.
- Determine the quantity and purpose of water being used.
- Determine other methods of water conservation.
- Conduct contests for employees (e.g., posters, slogans, or conservation ideas).

➤ PLANNING AND DESIGN

- Consider the following:
 - Physical conditions (drainage, soil type, sun/shade, etc.) and the use of the site (foot traffic, recreation, viewing, etc.)

- Creating shade areas, which can be 20 degrees cooler than non-shaded areas, decreasing evaporation.
- Grass areas only where needed; avoid small areas under 10 feet wide.
- Permeable materials such as porous concrete or permeable paving methods.
- Grading and directing surface run-off and rainfall gutters to landscaped areas as opposed to drainageways that exit the property.
- Incorporate high water demanding plants at the bottom of slopes, and maintain the use of existing trees, plants, and wildlife in the area during planning.
- Minimize the use of impermeable surfaces to lessen runoff and resulting stormwater pollution.
- Identify water source points.
- Develop a schematic of all water entry points (know where your faucets, time clocks, solenoids, booster pumps, sprinklers and bubblers are located).



- Identify capacity of each water-carrying unit and frequency of use.
- Determine specific use for each entry source.

➡ ANALYZE AND IMPROVE SOIL CONDITIONS

- Test the soil quality, nutrients and absorptive capacity, and then select plants based on findings. Adjust the pH level if necessary.
- Use organic matter (compost, mulch or manure) to increase the soil's water holding capacity. This helps improve water distribution and lowers levels of evaporation.
- When improving the soil of a given area, remember to treat a larger area around the planting to allow ample space for root systems.
- Prevent heavy construction equipment from compacting soil in areas around trees or other sensitive habitats.

➡ PLANT SELECTION

- Choose native, climate-appropriate species.
- Consider plants' water demand, pest tolerance, soil nutrient and drainage requirements.

➡ INTERIOR AREAS

- Discontinue continuous flow.
- Use ponded water where available.
- Adjust flows to reduce discharge of water.

- Install water-saving devices to decrease water consumption – restrooms (toilet dams and flappers), faucets (aerators), cooling systems.



- Retrofit toilets with high efficiency models that use 1.28 gallons per flush or less.

- Retrofit urinals with high efficiency models that use 0.5 gallons per flush.
 - Install showerheads with a flow rate of 1.5 gpm at 60 psi or less in all units.
 - Retrofit bathroom sink faucets with fixtures that do not exceed 1 gpm at 60 psi.

- Use recycling systems for chillers and cooling towers.
- Consider installing energy-and-water-efficient air conditioning equipment.

➡ MAINTENANCE PROCEDURES

- Sweep materials from floor instead of washing down whenever possible.
- Instruct clean-up crews to use less water where appropriate.
- Check water supply system for leaks.
- Repair dripping faucets and continuously-running or leaking toilets.

➡ DESIGN CRITERIA FOR TURF AND LANDSCAPE AREAS

- Contact the Department of Water Resources or your local water supplier about possible landscape water auditor classes for managers.
- Hire a landscape architect with water conservation and xeriscape experience.
- Use turf only where actually necessary: Immediate picnic areas/outside lunch areas and golf course target areas (greens, tees, landing areas).
- Turfgrass should be cut to the maximum recommended height for its type (generally a minimum of two inches to a maximum of four inches) for most efficient water use.
- Use only low-water use plant material in non-turf areas.

- Drip irrigation and microsprays place water at the base of the plant. This reduces evaporation and saves water by not soaking the entire ground surface. This works for trees, shrubs, and groundcovers.

- Use automatic irrigation systems monitored by moisture probes (i.e. tensiometers), and rain shut-off devices to cut power off during rain.
- Design dual watering systems with sprinklers for turf and low-volume irrigation for plants, trees, and shrubs. Operate sprinkler system before sunrise and after sunset. Amount of irrigation can be determined by the evapotranspiration rate, which DWR can help you determine.
- Use properly-treated waste water for irrigation where available.



- Make sure rotors or spray heads are mounted correctly. Replace with proper unit for the job.
- Post a current controller schedule inside the door of the controller.
- Check for leaking valves.
- Adjust the operating time (runtimes) of the sprinklers to meet appropriate seasonal or monthly requirements.
- Check plant leaves and take soil samples to confirm proper system functioning.
- Look into alternative sources for irrigation water (i.e. the use of wells as opposed to city water, water reuse operations from air conditioning condensate, storm water retention ponds, or cisterns, non-contact cooling water).
- Use dedicated water meters to monitor landscaping water use.
- Have a catchment/distribution uniformity test performed on-site to determine how evenly water is applied when sprinklers are in use.

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EXTERIOR AREAS

- Regular aeration of clay soils will improve water holding capabilities and prevent runoff.
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- Make sure irrigation water does not run onto streets or into alleys. Adjust sprinklers to water only plants and not sidewalks or roads.
- Use the same size nozzle when replacement is needed. Sprinklers should be replaced with the same brand of sprinklers. Spray heads are aligned with grade.
- Replace worn spray nozzles.
- Regulate pressure properly for system demands.



A Checklist of Water Conservation Ideas For



Hotels & Motels

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START A WATER CONSERVATION PROGRAM

- Increase employee awareness of water conservation.
- Install signs encouraging water conservation in employee and guest restrooms.
- When cleaning with water is necessary, use budgeted amounts.
- Determine the quantity and purpose of water being used.
- Read water meter weekly to monitor success of water conservation efforts.
- Assign an employee to monitor water use and waste.
- Seek employee suggestions on water conservation; put suggestion boxes in prominent areas.
- Determine other methods of water conservation.
- Conduct contests for employees (e.g., posters, slogans, or conservation ideas).

BUILDING MAINTENANCE

- Check water supply for leaks and turn off any unnecessary flows.
- Repair dripping faucets and showers and continuously-running or leaking toilets.

- Install flow reducers and faucet aerators in all plumbing fixtures where-ever possible.
 - Retrofit toilets with high efficiency models that use 1.28 gallons per flush or less.
 - Retrofit urinals with high efficiency models that use 0.5 gallons per flush.
 - Install showerheads with a flow rate of 1.5 gpm at 60 psi or less in all units.
 - Retrofit bathroom sink faucets with fixtures that do not exceed 1 gpm at 60 psi.



- Reduce water used in toilet flushing by adjusting the vacuum flush mechanism or installing toilet tank displacement devices (dams, bottles, or bags).
- As appliances or fixtures wear out, replace them with water-saving models.
- Shut off water supply to equipment rooms not in use.
- Minimize the water used in cooling equipment in accordance with manufacturers' recommendations. Shut off cooling units when not needed.

- Keep hot water pipes insulated.
- Avoid excessive air conditioner blow-down. (Monitor total dissolved solids levels and blow-down only when needed). Utilize cooling/HVAC systems that conserve water and energy. Single-pass cooling should not be permitted.
- Install appropriate treatment systems to manage cooling tower make-up water quality.
- Instruct clean-up crews to use less water for mopping.
- Switch from wet or steam carpet cleaning methods to dry powder methods.
- Change window cleaning schedule from periodic to an on-call/as required basis.

👉 POOLS AND FOUNTAINS

- Channel splashed-out pool water onto landscaping.
- Lower pool water level to reduce amount of water splashed out.
- Use a pool cover to reduce evaporation when pool is not being used.
- Reduce the amount of water used to clean pool filters.
- Designate a separate meter for fountains to monitor for use, leaks, and onset of malfunctions
- Prohibit use of potable water in water decorations
- Use a re-circulating water system and monitor evaporation
- Limit the hours of operation to only when the facility is in use, and shut system off during times of drought

👉 KITCHEN AREA

- Turn off the continuous flow used to clean the drain trays of the coffee/milk/soda beverage island: clean the trays only as needed.
- Turn dishwasher off when not in use. Wash full loads only.

- Use water-conserving ice makers. Replace water-cooled ice machines with efficient air-cooled models.
- Recycle water where feasible, consistent with state and county requirements.
- Recycle rinse water from the dishwasher or re-circulate it to the garbage disposal.
- Consider using “waterless woks.”
- Presoak utensils and dishes in ponded water instead of using a running water rinse.
- Wash vegetables in ponded water; do not let water run in preparation sink.
- Use air-cooled or closed-system re-circulating refrigeration systems.
- Use water from steam tables to wash down cooking area.
- Do not use running water to melt ice or frozen



👉 BAR

- Do not use running water to melt ice in the sink strainers.

👉 LAUNDRY

- Encourage guests to re-use sheets and towels by placing tent cards in rooms.
- Reprogram machines to eliminate a rinse or suds cycle, if possible, and if not restricted by health regulations.
- Wash full loads only.
- Evaluate wash formula and machine cycles for water use efficiency.
- Adequate towel rack space enables and encourages guests to hang towels neatly. This can result in less required daily washing.

- Use Tunnel washers or multi-load washer extractors that should utilize no more than 2 gallons of water per pounds of laundry. Energy Star and WaterSense certified regular commercial clothes washers use no more than 6 gallons per cubic foot of laundry.

✦ EXTERIOR AREAS

- Convert from high-water using lawns, trees, and shrubs to xeriscape: Plan landscapes that require less water by using native, zone-appropriate plants.
- Inventory outdoor water use for landscaped areas.
- Do not water landscape everyday; two-to-three



times a week is usually sufficient.

- Stop hosing down sidewalks, driveways, and parking lots.
- Wash autos, buses, and trucks less often.
- Avoid plant fertilizing and pruning that would stimulate excessive growth. Install good control systems to monitor and manage values referred to in the following points.
- Remove weeds and unhealthy plants so remaining plants can benefit from the water saved.
- In many cases, older established plants require only infrequent irrigation. Look for indications of water need such as wilt, change of color, or dry soil.
- Install soil moisture overrides or timers on sprinkler systems. Smart controllers self-adjust depending on moisture conditions, and of multiple programming to separate turf and non-turf areas.

- Time watering, when possible, to occur in the early morning or evening when evaporation and discourage weeds.
- Remove thatch and aerate turf to encourage the movement of water to the root zone.
- Avoid run-off and make sure sprinklers cover just the lawn or garden, not sidewalks, driveways, or gutters.
- In winter, water only during prolonged hot and dry periods (During spring and fall, most plants need approximately half the amount needed during the summer.)

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A Checklist of Water Conservation Ideas For



MULTI-PASS COOLING

➤ Conduct an Analysis and Audit of Cooling Towers

- Number of Towers
- Number of Passes
- Area, equipment or processes to be cooled
- Minimum cooling requirements (temperature, volume, duration, hours)
- Existence and location of meters in cooling towers
- Historical water use records for a minimum of three years
- Meter reading for make-up water
- Evaporative and other losses
- Total Dissolved Solids (TDS) Concentration in make-up and blow-down water
- Concentration ratios
- All health, safety, operational, regulatory, administrative and other requirements or policies that apply to the site

➤ Consider Water Conservation in Selection and Contracting for Cooling Systems

- Design, specify and bid cooling systems as models to comply with.

- Include a cycles of concentration, corrosion and microbial KPI specification in the contract for a water service treatment provider. This will help to result in prompt identification and repair of leaks.
- Ensure that the cooling tower sump or holding tank is sized to accommodate any water returning from system pipe work when re-circulating pumps are shut down.
- Install a non-return valve on the pump delivery side to minimize water loss during tower shut-down.

➤ Cooling Tower or Chiller Blow-down: *Water that is removed from re-circulating cooling water to reduce contaminant build-up.*

Typical Amounts: Amounts vary with water quality and other factors, but optimization of blow-down represents the greatest opportunity for water efficiency improvement in cooling tower systems.

- Install good control systems to monitor and manage values referred to in the following points.
- Keep the ratio of make-up water quality to blow-down with water quality high. This ratio is called the "concentration ratio," or "cycle of concentration."
- Typical past concentration ratios were 2 to 3. These ratios can be raised to six or more, depending upon make-up water quality as well as the use and sensitivity of the cooling system.

- Maintain a high initial make-up water quality.
- Install treatment systems designed to maximize make-up water quality and/or improve quality of re-circulating water. NOTE: Selection of treatment options and best management for water quality for treatment systems and operations are also important factors to consider.

- Install sub-meters on the make-up water feed line and the blow-down line.
- If loads allow, design towers and adequate controls to allow for proportional or continuous make-up rather than batching, to avoid saw-tooth patterns and increase overall cycles

➤ **Make-up:** *Water that is added to cooling towers to replace evaporation, blow-down and drift losses.*

Typical Amounts of Make-up: blow-down + evaporation + drift losses

- Maintain a high initial make-up water quality.
- Install treatment systems designed to maximize make-up water quality and/or improve quality of re-circulating water.
- Install sub-meters on the make-up water feed line and the blow-down line to enable careful monitoring and control of water use.

➤ **Evaporation:** *Water evaporated to cool the temperature of the remaining water. Loss of heat by evaporation is about 1,000 BTU per pound of water evaporated.*

Typical Amounts of Evaporation: 1% of the rate of flow of re-circulating water for every 10° drop in temperature achieved by the tower, or -3 gpm per 100 tons of cooling load. (A ton, when used to describe cooling tower capacity, is about 12,000 BTU per hour of heat removal). Dew points also affect cooling. Cooling reduced when dew points are high. The lower the dew point, the greater temperature difference between water flowing into and out of the tower.

- Install good control systems so that when the dew point temperatures are low, fans can be slowed by using motor speed controls or cycled on and off, saving energy and evaporative losses.

➤ **Drift Losses:** *Water lost from the cooling tower in the form of mist carried out by air drafts.*

Typical Amounts of Drift Losses: 0.2 – 0.5% of total circulation rate.

- Reduce drift through baffles or drift eliminators

MAINTENANCE

➤ **Routine Check:**

- Test water sample of cooling towers for proper concentration of dissolved solids. Adjust blow-down flows as necessary.
- Measure water treatment chemical residue in circulating water.
- Check strainers on bottom of collection basins.
- Check switches on make-up water controls.
- Inspect all moving parts.
- Check for excessive vibration in motors, fans, pumps, etc.
- Manually test the vibration limit switch by jarring it.
- Look for oil leaks in gearboxes.
- Check seals in cooling tower circulating pump for leaks.
- Insure the ball float is set and operating properly.
- Check for any structural deteriorating, loose connectors, water leaks, signs of drift, or openings in casings.
- Ensure that fill media within the cooling tower, if fitted, is in good condition to obtain optimum cooling. Fill which can be easily removed and cleaned will reduce build-up and increase efficiency.
- Seek and repair any unwanted flows in the cooling tower system.
- Maintain a log and watch for changes in:
 - Meter readings for make-up water
 - Meter readings for blow down water
 - Evaporative and other losses
 - Total Dissolved Solids (TDS) concentration in make-up and blow-down water
 - Concentration ratios

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A Checklist of Water Conservation Ideas For



Restaurants

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GENERAL SUGGESTION

- Increase employee awareness of water conservation.
- Install signs encouraging water conservation in employee and customer restrooms.
- When cleaning with water is necessary, use budgeted amounts.
- Read water meter weekly to monitor success of water conservation efforts.
- Assign an employee to monitor water use and waste.
- Seek employee suggestions on water conservation; put suggestion boxes in prominent areas.
- Determine the quantity and purpose of water being used.
- Determine other methods of water conservation.
- Conduct contests for employees (e.g., posters, slogans, or conservation ideas).
- Provide table signs urging water conservation.
- Serve water only when requested by the customer.

BUILDING MAINTENANCE

- Reduce the load on air conditioning units by shutting off air conditioning when and where it is not needed.

- Check the water supply system for leaks and turn off any unnecessary flows.
- Repair dripping faucets and showers and continuously-running or leaking toilets.
- Install flow reducers and faucet aerators in all plumbing fixtures where-ever possible.
- Reduce water used in toilet flushing by adjusting the vacuum flush mechanism or installing toilet tank displacement devices (dams, bottles, or bags).
- As appliances or fixtures wear out, replace them with water-saving models.
- Shut off water supply to equipment rooms not in use.
- Minimize the water used in cooling equipment in accordance with manufacturers' recommendations. Shut off cooling units when not needed.
- Keep hot water pipes insulated.
- Avoid excessive air conditioner blow-down. (Monitor total dissolved solids levels and blow-down only when needed).



- Instruct clean-up crews to use less water for mopping.
- Switch from wet or steam carpet cleaning methods to dry powder methods.
- Change window cleaning schedule from periodic to an on-call/as required basis.

➡ KITCHEN AREA

- Turn off the continuous flow used to clean the drain trays of the coffee/milk/soda beverage island: clean the trays only as needed.
- Consider using a “waterless wok.”
- Dishwashers
 - Promote hand-scraping the dishes before loading a dishwasher.
 - Turn dishwasher off when not in use. Wash full loads only and try to fill racks to maximum capacity.
 - Keep flow rates as close to manufacturer’s specifications as possible.
 - Install advanced rinse nozzles.
 - Install door switches for convenient on/off access.
- Check voltage of boosters heater to make sure it fits the machine.
- Use “steam doors” to prevent loss of water due to evaporation.
- Check volumes of service and estimate facility needs. A better option may be a larger machine that has a lower water flow per rack rate.
- Faucets
 - Do not leave faucets on to thaw vegetables and other frozen foods.
 - Post water conservation literature and reminders to staff around work areas.
 - Educate staff to look for leaks and broken faucets in their area.



- Replace spray heads with high- efficiency sprayers to reduce water flow.
- Adjust flow valve to reduce water flow.
- Check for leaks and worn gaskets.
- Install a flow restrictor to limit maximum flow rate to 2.5 gpm or less.
- Install a 2.5 gpm faucet aerator, maximizing flow efficiency by increasing air-flow to the stream.
- Consider infrared or ultrasonic sensors that activate water flow only in the presence of hands or some other object.
- Install pedal operated faucet controllers to ensure valves are closed when not in use.



- Use water from steam tables to wash down cooking area.
- Use water-conserving ice makers, one that uses an air-cooled compressor if possible.
- Recycle water where feasible, consistent with state and county requirements.
- Recycle rinse water from the dishwasher or re-circulate it to the garbage disposal.
- Minimize use of a garbage disposal by using a strainer/trap and disposal in trash or compost.
- Presoak utensils and dishes in ponded water instead of using a running-water rinse.
- Wash vegetables in ponded water; do not let water run in preparation sink.

➡ BAR

- Do not use running water to melt ice in the sink strainers.

➡ EXTERIOR AREAS

- Convert from high-water using lawns, trees, and shrubs to xeriscape: Landscape design

incorporating plants providing beautiful color and requiring less water. Plan landscapes that require less water.

- Inventory outdoor water use for landscaped areas.
- Do not water landscape everyday; two-to-three times a week is usually sufficient.
- Stop hosing down sidewalks, driveways, and parking lots.
- Wash autos, buses, and trucks less often.
- Avoid plant fertilizing and pruning that would stimulate excessive growth. Install good control systems to monitor and manage values referred to in the following points.



- Remove weeds and unhealthy plants so remaining plants can benefit from the water saved.
- In many cases, older established plants require only infrequent irrigation. Look for indications of water need such as wilt, change of color, or dry soil.
- Install soil moisture overrides or timers on sprinkler systems.
- Time watering, when possible, to occur in the early morning or evening when evaporation is lowest.
- Mulch around plants to reduce evaporation and discourage weeds.
- Remove thatch and aerate turf to encourage the movement of water to the root zone.
- Avoid run-off and make sure sprinklers cover just the lawn or garden, not sidewalks, driveways, or gutters.
- Throughout winter, water only during prolonged hot and dry periods (During spring and fall, most

plants need approximately half the amount needed during the summer.)

For more information, contact:

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A CHECKLIST OF WATER CONSERVATION IDEAS FOR *Laundries & Linen Suppliers*

This checklist provides water conservation tips successfully implemented by industrial and commercial users. Adapted from original material by: the Los Angeles Department of Water and Power; Amy Vickers "Handbook of Water Use & Conservation" and the North Carolina Division of Pollution Prevention.

➡ GENERAL SUGGESTIONS

- Increase employee awareness of water conservation. Seek employee suggestions on water conservation; put suggestion boxes in prominent areas. Conduct contests for employees (posters, slogans, ideas, etc.)
- Install signs encouraging water conservation in employee and customer restrooms..
- Determine the quantity and purpose of water being used. Read water meters weekly to monitor success of water conservation efforts.
- Assign an employee to monitor water use and waste.
- As appliances or fixtures wear out, replace them with high efficiency water-saving models., ideally with *WaterSense* labels.
- Install high efficiency commercial washers.
- Shut off water supply to equipment rooms not in use.
- Keep hot water pipes insulated.
- Avoid excessive filter or softener back flush. Back flush only when needed.
- Avoid excessive air conditioner blow-down. (Monitor total dissolved solids levels and blow-down only when needed).

➡ BUILDING MAINTENANCE

- Check water supply for leaks and turn off any unnecessary flows.
- Repair dripping faucets, continuously-running or leaking toilets and other leaking fixtures.
- Install flow reducers and faucet aerators in all plumbing fixtures where-ever possible.
- Install High Efficiency Toilets, or reduce water used in toilet flushing by adjusting the vacuum flush mechanism or installing toilet tank displacement devices (dams, bottles, or bags).
- Minimize the water used in cooling equipment in accordance with manufacturers recommendations. Shut off cooling units when not needed.
- When cleaning with water is necessary, use budgeted amounts

➡ OPERATIONS

- Evaluate wash formula and machine wash cycles for water use efficiency.
- Operate equipment with full loads only.

- Reduce water levels if possible for partial loads to minimize required water per load.
- Replace or modify existing conventional laundry equipment to reduce water use.
- Replace traditional commercial clothes washers with high efficiency commercial washers, which can save as much as two thirds of the energy and water used by traditional models.
- Install a computer-controlled rinse water reclamation system. These can save as much as 25% of wash load's water demand by diverting rinse water to a storage tank for later re-use as wash water.
- Install a wash and rinse water treatment and reclamation system , except where prohibited by health codes in specialized situations. Recycling both wash and rinse water can reduce a laundry's water demand by as much as 50%.
- Install a continuous batch (or tunnel) washer, which can reduce water demand by about 60% compared with that of washer extractors.
- Install an electrically generated ozone laundry system, which can reduce water use by about 10% compared with that of traditional laundering systems. The ozone acts as a cleaning agent and reduces detergent use by 30 to 90 percent.
- Consult service personnel and the laundry's supplier of chemicals for the washer extractors to ensure that equipment is operating at optimal efficiency.
- Avoid excessive back-flushing of filters or softeners; back-flush only when necessary.
- Place "save water" notices in hotel and motel guest rooms, urging guests to save water by minimizing the amount of water that needs to be laundered.
- Inventory outdoor water use for landscaped areas.
- Make sure irrigation water does not run into gutters, streets or alleys. Use controllers on sprinkler systems.
- Do not water landscape everyday; two-to-three times a week is usually sufficient.
- Stop using water to clean sidewalks, driveways, loading docks and parking lots. Consider using brooms or motorized sweepers instead.
- Wash autos, buses, and trucks less often.
- Avoid plant fertilizing and pruning that would stimulate excessive growth. Install good control systems to monitor and manage values referred to in the following points.
- Remove weeds and unhealthy plants so remaining plants can benefit from the water saved.
- In many cases, older established plants require only infrequent irrigation. Look for indications of water need such as wilt, change of color, or dry soil.
- Install soil moisture overrides or timers on sprinkler systems.
- Time watering, when possible, to occur in the early morning or evening when evaporation and discourage weeds.
- Remove thatch and aerate turf to encourage the movement of water to the root zone.
- Avoid run-off and make sure sprinklers cover just the lawn or garden, not sidewalks, driveways, or gutters.
- Ensure that irrigation systems are equipped with a rain shut-off device.
- Install smart controllers capable of responding appropriately to weather or soil moisture conditions.

EXTERIOR AREAS

- Convert from high-water using lawns, trees, and shrubs to *xeriscape*: Landscape design incorporating plants providing beautiful color and requiring less water. Plan landscapes that require less water.

For more information, contact:

**Maui County Department of Water Supply
Water Resources and Planning Division**

59 Kanoa Street Wailuku, HI 96793

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A Checklist of Water Conservation Ideas For



Schools & Colleges

This checklist provides water conservation tips successfully implemented by industrial and commercial users. This list has been revised from the original copy first published and distributed by the Los Angeles Department of Water and Power.

GENERAL SUGGESTIONS

- Increase employee awareness of water conservation.
- Install signs encouraging water conservation in employee and student restrooms.
- When cleaning with water is necessary, use budgeted amounts.
- Read water meter weekly to monitor success of water conservation efforts.
- Assign an employee to monitor water use and waste.
- Seek employee and student suggestions on water conservation; put suggestion boxes in prominent areas.
- Determine the quantity and purpose of water being used.
- Determine other methods of water conservation.
- Conduct contests for employees and students (e.g., posters, slogans, or conservation ideas).
- Make up-to-date reading materials available for students and employees in the library and classroom.

BUILDING MAINTENANCE

- Check water supply system for leaks.

- Turn off any unnecessary flows.

- Repair dripping faucets and showers and continuously-running or leaking toilets.



- Install flow reducers and faucet aerators in all plumbing fixtures where possible.
 - Retrofit toilets with high efficiency models that use 1.28 gallons per flush or less.
 - Retrofit urinals with high efficiency models that use 0.5 gallons per flush.
 - Install showerheads with a flow rate of 1.5 gpm at 60 psi or less in all units.
 - Retrofit bathroom sink faucets with fixtures that do not exceed 1 gpm at 60 psi.
- Reduce the water used in toilet flushing by either adjusting the vacuum flush mechanism or installing toilet tank displacement devices (dams, bottles, or bags).
- As appliance or fixtures wear out, replace them with water-saving models.

- Shut off water supply to equipment rooms not in use.
- Minimize the water used in cooling equipment, such as air compressors, in accordance with manufacturer recommendations.
- Reduce the load on air conditioning units by shutting air conditioning off when and where it is not needed.
- Keep hot water pipes insulated.
- Avoid excessive boiler and air conditioner blow-down. (Monitor total dissolved solids levels, and blow-down only when needed.)
- Instruct clean-up crews to use less water for mopping.
- Change window cleaning schedule from periodic to an on-call/as-required basis.

✚ KITCHEN AND LAUNDRY AREAS

- Turn off the continuous flow used to clean the drain trays of the coffee/milk/soda beverage island; clean the trays only as needed.
- Turn dishwasher off when not in use. Wash full loads only.
- Make sure “electric eye” sensors are installed in your dishwasher to monitor dirt circulating in the water.
- Replace spray heads to reduce water flow.
- Recycle rinse water from the dishwasher or recirculate it to the garbage disposal.
- Do not use running water to melt ice or frozen foods. If necessary, use ponded water.
- Use water conserving ice makers.
- Presoak utensils and dishes in ponded water instead of using a running water rinse.
- Wash vegetables in ponded water; do not let water run in preparation sink.
- Use water from steam tables in place of fresh water to wash down cooking area.
- Reprogram washing machines to eliminate a rinse or suds cycles when possible and if not restricted by health regulations.
- Reduce water levels, where possible, to minimize water required per load of washing.
- Only wash full loads of clothes.
- Evaluate wash formula and machine cycles for water use efficiency.

✚ POOL

- Lower pool water to reduce amount of water splashed out.
- Use a pool cover to reduce evaporation when pool is not in use.
- Reduce amount of water used to clean pool filters.

✚ EXTERIOR AREAS

- Convert from high-water using lawns, trees, and shrubs to xeriscape – Landscape design incorporating plants that provide beautiful color and requiring less water. In the future, design landscapes that require less water, such as drought-resistant grass on playing fields.

- Inventory outdoor water use for landscape areas.



- Water landscape only when needed: two-to-three times a week is usually sufficient.
- Wash autos, buses, and trucks less often.
- Discontinue using water to clean sidewalks, driveways, loading docks, and parking lots. Consider using brooms or motorized sweepers.
- Avoid landscape fertilizing and pruning that may stimulate excessive growth.

- Remove weeds and unhealthy plants so remaining plants can benefit from the water saved.
- In many cases, older, established plants require only infrequent irrigation. Look for indications of water needs such as wilt, change of color, or dry soils.
- Install soil moisture overrides or timers on sprinkler systems.
- When possible, time watering to occur in the morning or evening when evaporation is lowest.
- Make sure irrigation equipment applies water uniformly.
- Investigate the advantages of installing drip irrigation systems.
- Mulch around plants reducing evaporation and discouraging weeds.
- Remove thatch and aerate turf to encourage the movement of water to the root zone.
- Avoid run-off and make sure sprinklers cover just the lawn or garden, not sidewalks, driveways, or gutters.
- In winter, water only during prolonged hot and dry periods (During spring and fall, most plants need approximately half the amount needed during the summer.)



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It's Easier To Save What You Measure & Watch

- Prepare an inventory of anticipated fixture units and counts, water uses and water using appliances and equipment, including landscapes, laundries, kitchens, cooling and other areas throughout the facility, locations and purposes of controls, sub-meters, water filters or recycling systems, locations and amounts of irrigated acreage, irrigation system elements, controllers, circuits and settings, acreage and volume of pools, filtration equipment, etc.
- Design structures such that individual units and or operations can be metered separately or at least sub-metered.
- Once an inventory of water uses and conservation opportunities has been made, and measures undertaken, it is important to take stock of the actual performance of conserving measures. A useful tool is an annual tally of what has been done, the goal of each measure taken, and how the results panned out. Document the recorded savings or reductions in peak factors, to assist in fine-tuning facility management for conservation as time goes on. An annual inventory of uses, performance, and changes made to fixtures or processes such as treatment, recycling, or other measures to conserve, as well as water use impacts of each, should become a regular practice.
- A regular, pro-active maintenance program should be established for all areas of the complex. This should include checking for and repairing leaks, both indoors and out. It should also include checking valves, water pressures etc. where specific water using operations call for this as part of normal maintenance.
- Inspect steam lines and traps, all plumbing

fixtures, hot and cold water lines, drinking fountains, and water-using appliances routinely in order to catch problems early and to keep these devices operating optimally.

- Shut off the water supply to equipment in areas that are not currently in use.

Fixtures and Appliances

- Specify, select and or require tenants to utilize efficient fixtures and appliances. Efficient water use can save on electricity as well. A list of WaterSense certified high-efficiency toilets and other fixtures may be found at <http://www.epa.gov/WaterSense/pp/index.htm>.
- Toilets should be high efficiency models that use 1.28 gallons per flush or less
- Urinals should be high efficiency models that use 0.5 gallons per flush or less.
- Showerheads, if any, should have a flow rate of 2 gpm at 60 psi or less in all units.
- Bathroom sink faucets with fixtures should not exceed 1 gpm at 60 psi. (even more efficient models are available)

Cooling

- Cooling / HVAC systems should be constructed, commissioned and operated in a manner that conserves water as well as energy.
- Single pass cooling should not be permitted.
- Recent data indicate that increasing energy efficiency in coolers can also increase water efficiency. Consider ordering units that comply with LEED specifications for energy efficiency and

controllability, as well as the specific water conservation measures listed below for multi-pass systems:

- Install control systems and sub-metering to monitor and manage water quality and other parameters in make-up water and blow-down.
- Install appropriate treatment systems to manage water quality in cooling tower make-up water.
- Operate cooling towers with greater than 5 cycles of concentration if possible.
- Minimize drift losses with baffles or drift eliminators.
- Establish a proactive cooling system maintenance and monitoring program.

Kitchens, Restaurants, Snack Shops, Ice Making, Cooking and Washing

- Select efficient air cooled ice machines.
- Refrigeration systems should be air-cooled or closed-system recirculating systems.
- Pre-rinse spray valves on dishwashers shall have a flow rate equal to or less than 1.6 gpm at 60 psi.
- Food steamers should be self-contained "boilerless" or "connectionless" models.
- Wok stoves should be "waterless woks".
- Ware washing units should have flow rates of less than 1 gallon per rack.
- Install an on-demand water heater near sinks and other places where warm water is needed to avoid having customers and employees run water while waiting for hot water.
- Use water from steam tables to wash down cooking area.
- If it is necessary to use water (e.g., grocery store meat cutting rooms, commercial kitchens, and medical facilities), employ high pressure, low-volume sprays (which work better than lowpressure, high volume sprays). Use portable high pressure pumps where needed to reduce the amount of water used for cleaning by up to 40 percent. When cleaning with water, stick to budgeted amounts for each job.
- Do not use running water to thaw food.
- Place tent cards in restaurants informing guests that water is available upon request, rather than automatically serving it.

Laundries and Washing Services

- If tunnel washers or multi-load washer extractors are used, they should utilize no more than 2 gallons of water per pound of laundry.
- If regular commercial clothes washers are used, install washers that are Energy Star and WaterSense certified, or have a water factor (gallons/cubic foot of laundry) of not more than 6.

Landscape

- All irrigated areas shall be equipped with smart controllers capable of self-adjusting to account for moisture conditions, and of multiple programming for separation of turf and non-turf areas.
- Irrigation valves and circuits should be arranged such that plants with different water requirements are watered separately and appropriately. (hydrozones).
- Select native plant species that are adapted to the natural rainfall and salt conditions in the area. The use of climate-adapted native plants conserves water and protects watersheds from the spread of invasive plant species.
- Install spring-loaded valves or timers on all manually operated hoses.
- Water features are discouraged in general. However, even water features can be made more efficient. High efficiency filtration systems are available fountains.

Employee Involvement

- Aside from a regular pro-active inspection and maintenance, encourage employees to be conscious of water use. Think about how floors and other areas are cleaned. Is water necessary? Would brooms or wet wash rags work as well as hoses?
- Set up an easy procedure for employees to report leaks.
- Repair leaks and malfunctions promptly, not only to save water but to show employees that their reports of leaks are taken seriously.
- Place a "Water Conservation Suggestion Box" in a conspicuous place and ask for employee suggestions.

