

ORDINANCE NO. _____

BILL NO. _____

A BILL FOR AN ORDINANCE AMENDING TITLE 20
MAUI COUNTY CODE, RELATING TO WATER CONSERVATION IN THE LANDSCAPE

BE IT ORDAINED BY THE PEOPLE OF THE COUNTY OF MAUI

SECTION 1. Title ____, Maui County Code, is amended by adding a new chapter to be
appropriately designated and to read as follows:

Chapter 20.32 or 14.03

WATER CONSERVATION IN THE LANDSCAPE

Sections:

- I. Findings
- II. Purpose & Intent
- III. Periodic Update of Regulations
- IV. Definitions
- V. Applicability
- VI. Requirements
- VII. Landscape Documentation Package
- VIII. Enforcement
- IX. Fees
- X. Forms and Attachments (References to be Developed)
- XI. Landscape Certification

I. Findings

The Maui County Council has found that:

- A. The limited supply of County waters are subject to ever increasing demands
- B. Maui County is growing in population, and it is important to implement water conservation measures now in order to stretch supplies as long as possible.
- C. Maui County's economic prosperity depends upon adequate water supply.
- D. Studies have shown that landscape accounts for about fifty percent of all water used in urban areas. Water conserving landscapes can use as little as one third of the water of a traditional non-water-conserving landscape. These savings can be substantial, if projected through the life of a development.
- E. Water conservation will save money and can be accomplished without degradation of aesthetic values.
- F. State and County policy and Community Plans promote conservation and efficient use of water.
- G. Landscapes provide recreation areas, cleaner air and water, prevent erosion, offer fire

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protection and help to partially replace ecosystems where these have been displaced by development

- H. Landscape design, installation and maintenance can and should be water efficient.
- I. The high cost of living in Hawaii and the even higher cost of living in Maui leaves our community with less capital for development of new water resources. Water conservation can reduce competition for capital which could otherwise be spent on proper system maintenance and other priorities.
- J. Proper landscape conservation prevents waste of drinking water by inefficient use in the landscape.

II. Purpose and Intent

- A. Promote the values and benefits of landscapes while recognizing the need to invest water and other resources as efficiently as possible;
- B. Establish a structure for designing, installing and maintaining water efficient landscapes in new and refurbished projects;
- C. Establish provisions for water management practices and water waste prevention for established landscapes.
- D. Reduce supplemental water use through climate-based plant material choices, design, irrigation scheduling, and soil management.
- E. Promote the conservation of potable and non-potable water by encouraging the preservation of appropriate native plant communities, the use of site-specific plant materials and to establish techniques for installation and maintenance of landscape materials and irrigation systems.
- F. Improve the aesthetic appearance of commercial, industrial and residential areas through the incorporation of appropriate landscape features into development in ways that harmonize and enhance the built environment.
- G. Preserve the native and endemic vegetation of the island while encouraging the removal and discouraging the use of species which can damage the watershed or cause other nuisance.
- H. Encourage the utilization of readily available water conserving technology to maximize resource efficiency.

III. Periodic Update of Regulations

The Department of Water Supply (*Arborist Commtee?*), after consulting with and considering the recommendations of interested agencies, may from time to time propose to the Administration, Board and Council regulations to establish additional or revised procedures to implement this chapter, and to make more specific the standards and guidelines prescribed in this chapter. Such regulations as are approved by resolution of the Council shall have the force and effect of law unless otherwise indicated.

IV. Definitions

The words used in this ordinance have the meaning set forth below:

Amendment	Materials added to the soil, such as compost, leaf mold, peat moss, ground bark or other materials, which improve aeration and percolation of clay soild and may help hold water in sandy soils.
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Anti-drain Valve or Check Valve	A valve located under a sprinkler head to hold water in the system so it minimizes drainage from lower elevation sprinkler heads.
Application Rate	The depth of water applied to a given area, usually measured in inches per hour.
Athletic Field	A turf area used primarily for organized sports.
Automatic Control Valve	A device used to control the flow of water at a particular section of the irrigation system.
Automatic Controller	A mechanical or solid state timer, capable of operating valve stations to set the days and length of time of a water application.
Backflow Prevention Device	A safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.
Bubblers	Irrigation heads which deliver water to the soil adjacent to the heads.
Check Valve	A valve located under a sprinkler head to hold water in the system so it minimizes drainage from the lower elevation sprinkler heads.
Controller	A device that operates each irrigation zone for a determined time and frequency, based upon irrigation schedule or in some cases feedback of soil moisture content or climatic conditions.
Conversion Factor (0.623)	A number that converts the maximum water allowance from inches per acre per year to gallons per square foot per year. The conversion factor is 0.623 and is calculated as follows (325,829 gallons per acre-foot / 43,560 square feet per acre)/12 inches per foot = 0.623
Covenants	Agreements entered into by property owners, leaseholders and renters which set conditions for the use, maintenance and or sale of property.
Damaged Land Reclamation Project	A parcel or parcels of land which are the subject of plans or efforts to restore or reclaim ecological or other values after that land has been quarried, mined or used for other purposes disruptive to the natural landscape. Such project may have the goals of restoring a site to a condition similar to or compatible with that which existed prior to such use, or to develop the site to some other productive use of the land; to restore forests, pasture, crops, wildlife area, or etc. However, exemptions under this ordinance, shall not apply to projects or efforts to develop a site for subsequent development/construction.

Density Factor	Is based on how closely plant material is spread in relationship to the plant material's mature root / branch spread.
Development	The construction, erection or emplacement of one or more buildings, structures, or surface improvements on land which is a premise in order to establish or expand a principal residential or non-residential use.
Distribution Uniformity	Measure of the uniformity of irrigation water applied over a given area. Sometimes calculated based on the ratio of the average low quarter depth of irrigation water compared to the average depth of irrigation water applied.
Drip Emitter	An irrigation emission device that delivers a measured reduced quantity of water at a consistent rate of discharge.
Drip Irrigation	Low pressure, low volume irrigation applied slowly near or at ground level to minimize runoff and loss to evaporation.
Ecological Restoration Project	A project intended for the restoration of a native ecosystem or area, and not intended for continued irrigation.
Effective Precipitation or Useable Rainfall	The portion of rainfall or precipitation that actually becomes available for plant growth. For instance, during very dry periods with only limited rainfall, precipitation would not be considered effective, as it would likely evaporate from the surface before soaking into the ground. Effective precipitation enters the soil and becomes available to the plant.
Emitter	Drip irrigation fittings that deliver water slowly from the system to the soil.
Established Landscape	The point at which plants in the landscape have developed roots into the soil adjacent to the root ball.
Establishment Period	The period until the plants in the landscape have developed roots in the soil adjacent to the root ball. Generally the first year after installing a plant in the landscape.
Estimated Applied Water Use	Estimated amount of water to be applied to the landscape through irrigation.
Estimated Total Water Use	Estimated total use of the landscape, including precipitation and irrigation water.
ET Adjustment Factor (0.8)	A factor of 0.8, that when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major

influences upon the amount of supplemental water that needs to be applied to the landscape.

ET Controller

Controller that automatically adjusts the watering time and frequency based on local weather conditions such as rain, wind, heat, or estimated evaporation and transpiration rates.

Evapotranspiration

The quantity of water evaporated from adjacent soil surfaces and transpired by plants during a specific time.

Flow Rate

The rate at which water flows through pipes and valves.

Flow Restriction Device

Device applied by the water utility to the customer's meter that restricts the volume of flow to the customer.

Fugitive Water

The pumping, flow, release, escape or leakage of any water from any pipe, valve, faucet, connection, diversion, well or any facility for the purpose of water supply, transport, storage, disposal or delivery to adjacent property or the public right-of-way.

Hand Watering

The application of water for irrigation purposes through a hand-held hose, including hoses moved into position by hand and left to flow freely or through a shut-off nozzle.

Heritage Plants

Any plant or group of plants which meet one or more of the following criteria: 1) having a relationship to an event of cultural or historical significance, 2) is deemed of public interest or special interest by the County's *Arborist Committee* ; 3) a tree having a circumference of 72"; 4) a native species which is classified as rare, endangered , threatened or species of concern. 5) *other criteria?*

High Water Use Turf

A surface layer of earth containing regularly mowed grass, with its roots, which requires large volumes and or frequent application of water throughout its life. High water use grasses include but are not limited to varieties of bluegrass, varieties of ryegrass, varieties of fescue and bent grass.

Hydrozone

A portion of the landscaped area having plants with similar water needs that are served by a valve or set of valves with the same schedule. A hydrozone may be irrigated or non-irrigated, but should have similar characteristics in terms of water needs of the plants, precipitation rate of irrigation devices, solar radiation, wind conditions, soil type and slope. A naturalized area planted with native vegetation that will not need supplemental irrigation once established is a non-irrigated hydrozone.

Irrigation Audit	Procedure to collect and present information concerning the design, maintenance, uniformity of application rate, precipitation rate, efficiency, and general condition of an irrigation system and its components.
Infiltration Rate	The rate of water entry into the soil expressed as a depth of water per unit of time in inches per hour.
Irrigation Efficiency	The measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum irrigation efficiency for purposes of this ordinance is 0.625. Greater irrigation efficiency can be expected from well designed and maintained systems.
Landscape Coefficient	The water use of a particular variety and type of plant material multiplied by the density of that plant material multiplied by a factor for the subject microclimate. <i>REMOVE THIS ONE?</i>
Landscape Documentation Package or Application	A package documenting landscape plans, which includes: a water conservation concept statement, landscape design plan, grading design plan, soil analysis, proposed vegetation inventory, irrigation design plan, irrigation schedules, calculation of the maximum water allowance, maintenance schedule, irrigation audit schedule, and certificate of substantial compliance.
Landscape Irrigation Audit	A process to perform site inspections, evaluate irrigation systems, and develop efficient irrigation schedules.
Landscaped Area	The entire parcel less the building footprint, driveways, non-irrigated portions of parking lots, hardscapes (such as decks and patios), and other non-porous areas. Includes the public right-of-way. Water features are included in the calculation of the landscaped area.
Lateral Line	The water delivery pipeline that supplies water to the emitters or sprinklers from the valve. (this definition applies to landscape irrigation only)
Low Head Drainage	A condition in which water siphons out of the lowest head in a sprinkler zone after watering is completed. When the water flow to the zone has been shut off at the end of its cycle, the remaining water in the lines will drain downhill to the lowest point. If a sprinkler head is located in the lowest part of the system, water will flow out of that head until an equilibrium has been reached or all of the water has emptied out of that zone's pipes. This can usually be corrected by adjustments to the system or installation of

devices, called drain check valves, that can prevent low head drainage

Low Water Use Plants

Plants which are able to survive without supplemental water once established as specified in _____ plant list.

Main Line

The pressurized pipeline that delivers water from the water source to the valve or outlet. (this definition applies to landscape irrigation only)

Mature Landscape

The point at which plants in the landscape have developed roots into the soil adjacent to the root and are somewhat self-sufficient.

Maximum Applied Water Allowance

For design purposes, the upper limit of annual water use for the established landscaped area as specified in section _____. It is based upon the area's reference evapotranspiration, the ET adjustment factor, and the size of the landscaped area. The amount of water recommended on an annual basis in the irrigation schedule shall not exceed the maximum water allowance.

Medium and Low Water Use Turf

A surface layer of earth containing regularly mowed grass, with its roots, which requires moderate or low volumes and or frequencies of application of water once established as specified in the _____ plant list. Low and medium water use grasses include but are not limited to Bermuda and Bermuda hybrids, Zoysia, blue grama and Buffalo Grass.

Medium Water Use Plants

Plants which require some supplemental watering throughout the life of the plant as specified in the _____ plant list.

Mister

A device that produces a cooling effect by emitting fine particles of water into the air in the form of a mist.

Moisture Sensing Device

A device that measures the amount of water in the soil

Model Home

A dwelling built first by a developer to allow potential purchasers to see what the finished product will look like once the other homes in the development are completed.

Mulch

Any material such as leaves, bark, straw, wood chips or other materials applied to the soil surface to reduce evaporation.

New Development

Any development approved by Maui County after the effective date of this ordinance, including those developments which have

received some approvals prior to the effective date of this ordinance but which have not already submitted all construction plans or constructed landscape improvements.

Operating Pressure	The pressure at which a system of sprinklers operates, usually indicated at the base of a sprinkler.
Overhead Sprinkler Irrigation System	A system in which water is distributed by overhead high-pressure sprinklers or guns or by lower-pressure sprays. A system utilizing sprinklers, sprays, or guns mounted overhead on permanently installed risers is often referred to as a <i>solid-set</i> irrigation system.
Overspray	Water which is delivered beyond the landscaped area, wetting pavements, walks, structures, or other non-target landscaped areas.
Percolation	The movement of water through the soil
Plant Factor	A factor that when multiplied by reference evapotranspiration, estimates the amount of water used by plants. For purposes of this ordinance, the average plant factor of low water using plants ranges from 0 to 0.3, for average water using plants 0.4 to 0.6, and for high water using plants the range is 0.7 to 1.0.
Practical Turf Areas	The use of turf only in those areas of active play or recreation such as sports fields, school yards, picnic grounds, other areas with intense foot traffic, etc. These shall be planted with drought tolerant and non-invasive varieties of turf. Native grasses are encouraged.
Rain Sensing or Shut-off Device	A system which automatically shuts off the irrigation system when it rains
Record Drawing or As-built	A set of reproducible drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor.
Recreational Area	An area devoted to active sports, play or picnicking, or to facilities and equipment for recreational purposes, swimming pools, tennis courts, playgrounds, community clubhouses, and other similar uses.
Recycled Water, Reclaimed Water, or Treated Effluent Water	Treated or recycled water of a quality suitable for nonpotable uses such as landscape irrigation, not intended for drinking.
Reference	A standard measurement of environmental parameters which affect

**Evapotranspiration
or ETo**

the water use of plants. Eto is given in inches per day, month or year as represented in section _____, and is an estimate of the evapotranspiration of a large field of four to seven inch tall cool-season grass that is well watered.

Rotary Nozzle

(This definition needs work) A rotating, multi-stream, multi-trajectory rotating (MSMTR) sprinkler which distributes water in a number of individual streams of varying trajectories. This helps to uniformly distribute water throughout the radius range. Rotary nozzles are generally the size of the nozzles in fixed spray heads and thread onto pop-up heads just as spray nozzles do. They can also be threaded onto shrub adapters for installation onto risers. Rotary nozzles have variously cut nozzle openings that rotate during use to distribute the water more evenly throughout the watering pattern than spray heads. Rotary nozzles are designed to be installed on the risers of some of the most commonly used spray heads. They can be easily installed by simply unscrewing the existing spray nozzle and screwing on the rotary nozzle. Nozzle adjustment for radius or arc is a simple screw adjustment. The irrigation schedule can then be adjusted to reflect the lower precipitation rate and higher distribution uniformity. Rotary nozzles offer a low cost opportunity to improve the efficiency of many existing systems, particularly on smaller turf areas (approximately half an acre), which are among the highest water using (and wasting) sites. Water turns a small turbine (water wheel or fan) in the base of the unit which drives a series of gears that cause the head to rotate. The gear drive mechanism is sealed from dirt and debris. The nozzle can be installed on a spray head which normally uses conventional fixed pattern and variable arc spray nozzles. The rotary nozzle distributes the water in a pattern similar to a rotor head in the way that it rotates, compared to a normal spray nozzle which does not rotate. Due to their low precipitation rate, highly uniform distribution, and increased radius range, rotary nozzles can use less water than spray nozzles if the irrigation system is designed and installed properly. Rotary nozzles may be inserted into the body of the head after it has been installed. However, uniform and complete coverage depends selection of the appropriate nozzle for the area to be covered. Two different nozzles will cause the same rotary head to vary the distance of throw by 10 feet or more and increase water use by factors of two or three.

Run-off

Water which is not absorbed by the soils or landscape to which it is applied. For example, run-off may result from water that is applied at too great a rate (application rate exceeds infiltration rate) or when there is a severe slope. This section does not apply to stormwater run-off which is created by natural precipitation rather

than human-caused or applied water use.

Shut-off Nozzle	Device attached to the end of a hose that completely shuts off the flow, even if left unattended.
Single Family Residential	A lot or premise upon which is established one dwelling only. Of the allowable principal uses, such use shall be the only use on that lot or premise.
Smart Controller	Controller that automatically adjusts the watering time and frequency based on soil moisture, rain, wind, evaporation and transpiration rates or plant type.
Soil Moisture Sensing Device	A device, usually either a tensiometer or conductivity based device, used for sensing moisture in soils, and for controlling irrigation systems based on soil moisture. By sensing actual moisture levels in soils, such devices can save water in systems which have been over-irrigating. Preventing over irrigation can increase turf health. The use of automated soil moisture sensors also save labor by eliminating the need for re-programming and temporary rain shut-offs thereby reducing both water and labor costs for owners.
Soil Texture	The classification of soil based on the percentage of sand, silt and clay in the soil
Spray Irrigation	The application of water to landscaping by means of a device that projects water through the air in the form of small particles or droplets.
Sprinkler Head	A device which discharges water through a nozzle.
Static Water Pressure	The pipeline or municipal water supply pressure when water is not flowing.
Station, Circuit or Zone	An area served by one valve or by a set of valves that operate simultaneously.
Temporary Irrigation System	Irrigation systems which are installed and permanently disabled within a period of 36 contiguous months.
Turf	A surface layer of earth containing mowed grass with its roots. Annual bluegrass, Kentucky bluegrass, Perennial ryegrass, Red fescue, and Tall fescue are cool-season grasses. Bermudagrass, Kikuyugrass, Seashore paspallum, St. Augustinegrass, Zoysiagrass, and Buffalo grass are warm-season grasses.

Uniformity	Describes how evenly water is applied over a given area.
Useable Precipitation or Effective Rainfall	The amount of precipitation that contributes to the water needs of plants. Irrigation scheduling should be adjusted to reflect useable precipitation. <i>However, for purposes of calculating the maximum water allowance and estimating water use, useable precipitation is not to be included as a factor.</i>
Valve	A device used to control the flow of water in the irrigation system.
Water Conservation Concept Statement	A one page checklist and narrative summary of the project as shown in section _____.
Water Waste	The non-beneficial use of water. Non beneficial uses include but are not limited to: 1) landscape water which is applied in such a manner rate and or quantity that it overflows the landscaped area being watered and runs onto adjacent property or public right-of-way; 2) landscape water which leaves a sprinkler, sprinkler system or other applicaiton device in such a manner or direction as to spray onto adjacent property or public right-of-way; 3) washing of vehicles, equipment or hard surfaces such as parking lots, aprons, pads, driveways or other surfaced areas when water is applied in sufficient quantity to flow from that surface onto adjacent property or the public right of way; 4) water applied in sufficient quantity to cause ponding on impervious surfaces.

V. Applicability

- A.** This section shall apply to:
1. Water conservation landscape requirements shall apply to all new developments, excluding individual single family homes of less than ¼ acre.
 2. New development or refurbishment projects involving more than two homes.
 3. Common areas in new and retrofitted developments
 4. Commercial , residential and industrial developments.
 5. New development applications shall include landscape documentation packages which require final approval at the time of final project approval.
 6. Public parks, with the exception of turf requirements
 7. Golf Courses, with the exception of turf requirements.
 8. Cemeteries, with the exception of turf requirements.
 9. School Grounds, with the exception of turf requirements.
- B.** This section shall not apply to
1. Non-irrigated landscapes
 2. Landscapes that are irrigated entirely with reclaimed water.
 3. Individual Home-owner provided landscaping of less than ¼ acre.

4. Home-owner provided landscaping of individual homes in areas where rainfall exceeds 50"/year.
5. Ecological restoration projects which do not require a permanent irrigation system
6. Mined-land reclamation projects that do not require a permanent irrigation system.
7. Commercial agricultural operations (defined as.....) are excluded from certain provisions as noted herein.

VI. Requirements

A. Ornamental Water Features (Fountains, Ponds, Pools, Others)

1. Water bodies that are part of the landscaping for new and rehabilitated developments shall be restricted. The surface area of the water body shall be counted as turf in the calculation for limitation of turf in landscaped areas, unless the water body is an integral part of the operations of the development. Fountains and other types of decorative bodies where water is sprayed into the air shall be discouraged. Some allowance will be made for fountains or ponds where well water or untreated water is used and the water supply is recirculated.
2. Recirculating water shall be used for decorative water features.
3. Covers for pools and spas are encouraged.
4. The total amount of water for a given project shall include water designated in the Estimated total water use calculation plus water needed for any water features, which shall be considered as a high water use hydrozone.
5. All ornamental uses of water in the common areas of a project such as ponds, lakes and fountains shall be supplied, operated and maintained with alternative sources of water if they are available.
6. Natural water features are not restricted, but should be clearly identified in the landscape documentation package.

B. Soils & Grading

1. Soils tests are required to determine the type of soil, soil structure, water holding capacity and fertility. Soil will be amended according to report recommendations. A minimum of 4" of organic soil amendment shall be incorporated into the top 8" of soil unless otherwise recommended by the soils report.
2. A soil analysis satisfying the following conditions shall be submitted as part of the landscape documentation and application
 - a. Determination of soil texture, indicating the percentage of organic matter
 - b. Approximate soil infiltration rate (measured or derived from soil infiltration rate tables)
 - c. Measure of pH
 - d. Measure of total soluble salts
3. Grading shall be minimized to avoid soil compaction
4. Mulch
 - a.. A minimum of two inches of mulch shall be added to the soil surface after planting. Non-porous material shall not be placed

under this mulch.

C. **Recycled Water**

1. The installation of recycled water irrigation systems shall be required for new developments, to allow for the current and future use of recycled water, in accordance with _____ (reclaimed water provisions) unless a written exemption has been granted and signed by the Departments of Public Works and Water Supply. *(revise to match current reclaimed water code)*
2. Irrigation systems in commercial, industrial, hotel and motel developments shall make use of recycled water unless a written exemption has been granted by the County Department of Public Works & Waste Management, stating that recycled water meeting all health standards is not available and will not be available in the foreseeable future.
3. Recycled water irrigation systems shall be designed and operated in accordance with all State and County codes.
- 4.

VII. **Design Criteria**

B. Planting shall be designed, developed and maintained in accordance with one of the two methods and requirements as follows:

1. **Turf Restriction Method**

- a. The maximum allowed turf and or water area (expressed as percent of planted area) shall be 25% for industrial, commercial, institutional, and public or quasi-public developments, residential developments with common areas, residential lots greater than ¼ acre or located in areas that receive less than 50" of rain per year.
- b. If turf is an essential part of the development, such as playing fields for schools or public parks, a higher percentage will be allowed, and will be evaluated on an individual basis.
- c. Types of plants in non-turf areaa - At least 90% of the plants in non-turf areas shall have low water requirements, or be promoted as drought resistant plants approved by the Water Department. A small percentage of the planted area (10%) can be used for non-drought tolerant varieties if they are grouped together and can be irrigated separately from plants with lesser water needs.

2. **Water Allowance Method**

- a. The estimated applied water use shall not exceed the maximum applied water allowance.
- b. Any plants may be used in the landscape using the water allowance method, provided that the applied water use does not exceed the maximum water allowance and that the plants meet the specifications set forth in Section __ on Plant Materials, above:
- c. The Estimated Water Allowance shall be calculated as follows:

Allowance = (ETo) (0.8) (area in square feet) (0.62) where:

Allowance = applied water in gallons per year
ETo =reference evapotranspiration in inches per year
(based on pan evaporation data)

water, and Effective Precipitation Disclosure Statement such as the one in Section ____ shall be included in the Landscape Documentation & Application Package

- i. If Effective Precipitation is included in the calculation for the Estimated Total Water Use, an Effective Precipitation Disclosure Statement shall be completed, signed and submitted with the Landscape Documentation Package & Application.
 - j. No more than 25% of the local annual mean precipitation shall be considered effective precipitation in the calculation of the estimated total water use.
- B. No turf shall be allowed in median strips or in areas less than 8' wide.
- C. Turf grass perimeters shall be minimized to improve irrigation efficiency. Long narrow strips of turfgrass such as traffic medians and areas between curbs and sidewalks are not permitted.
- D. Groundcovers other than lawns shall be used on slopes exceeding 10% to reduce runoff.
- E. Combined turf and decorative uses of water will be limited to reduce water use and evaporation. Public parks, golf courses, cemeteries and school grounds are exempted from turf limitations.
- F. Plants having similar water use shall be grouped together in different hydrozones.
- G. Fire prevention shall be addressed in areas that are fire prone. Information about fire prone areas and appropriate landscaping for fire safety is available from <the Fire Department?>.
- H. Turf grass perimeters shall be minimized to improve irrigation efficiency. Long narrow strips of turfgrass such as traffic medians and areas between curbs and sidewalks are not permitted. No turf shall be allowed in median strips less than 8 feet wide.
- I. **Plant Material**
1. Plants shall be selected appropriately based upon their adaptability to the climatic, geologic and topographical conditions of the site. The planting of trees is encouraged wherever it is consistent with other provisions of this ordinance.
 2. Protection and preservation of native species and natural vegetation are encouraged. Wherever practical, native species adapted to the natural rainfall of the area should be selected. Guidance may be found in the Maui County Planting Plan, *list additional sites ? the Department of Water Supply's (landscape brochure, website - or list sites hear, UH, maui nui botanical garden etc. ?)*
 3. At least 80% of the plants in non-turf areas shall be well suited to the natural climatic conditions of the subject area, and require little additional water. No more than ten percent of the plants selected for non-turf areas may be considered high-water use plants as defined _____.
 4. Nothing in this or any other section of this ordinance shall compel removal of heritage plants.
 5. Parks, Golf Courses, Cemeteries, and School Grounds, though exempt from turf restrictions applying to other landscapes, shall use drought tolerant turf species and shall use low-water use plants as much as

- possible.
6. The use of plants listed as nuisance species in _____ or of priority species for removal by the Maui Invasive Species Committee shall not be approved.

J. **Equipment**

1. Automatic irrigation systems shall be used for landscapes exceeding 2 acres.
2. Valves and circuits shall be separated based on required water use.
3. Plants which require different amounts of water shall be irrigated by separate valves. If on valve is used for a given area, only plants with similar water use shall be used in that area.
4. Separate valves shall be installed for turf and non-turf areas.
5. Drip or bubbler irrigation systems are required for trees with the exception of those which can be sustained by ground or rain water.
6. Drip irrigation systems are recommended for shrub, trees, and groundcovers
7. Drip and bubbler irrigation systems shall not discharge water in excess of 1.5 gallons per minute per device.
8. Drip systems shall be constructed of non-corrosive materials.
9. Sprinkler heads must have consistent precipitation rates within each control valve circuit.
10. Sprinkler heads shall be selected for proper area coverage, application rate, operating pressure, adjustment capability, and ease of maintenance.
11. Sprinkler heads which are used on slopes exceeding 10% and which are located within 10 feet of any hardscape shall have a precipitation rate that does not exceed 0.85 inches per hour
12. Pop-up sprinklers in turf areas shall be at least 4" high.
13. Sprinkler head orientation and throw shall be designed to minimize run-off and overspray into non-irrigated areas.
14. All sprinkler heads shall have serviceable check valves to prevent system drainage from the lowest head.
15. Serviceable check valves are required where elevation differential may cause low head drainage.
16. Anti-drain check valves shall be installed in strategic points to minimize or prevent low-head drainage.
17. All irrigation systems shall be equipped with a controller capable of dual or multiple programming.
18. Each controller must have multiple cycle start capacity and a flexible calendar program.
19. Automatic control systems shall be required for all irrigation systems and must be able to accommodate all aspects of the design.
20. All irrigation systems shall be equipped with a controller capable of dual or multiple programming for separation of turf and non-turf areas, multiple cycle capabilities and flexible calendar programming.
21. All irrigation controllers shall be equipped with water a percent adjustment feature.
22. Irrigation controllers shall be equipped with a rain shutoff device.

23. All automatically controlled irrigation systems shall utilize *SMART controllers* capable of responding appropriately for each lawn circuit.
24. Any irrigation equipment located within 12" of pedestrian and vehicular use shall be located entirely below grade or otherwise adequately protected from potential damage.
25. On grade piping shall not be allowed where subject to adjacent pedestrian traffic.
26. Large sprinkler zones shall be equipped with high uniformity rotary nozzles.
27. Drip irrigation systems shall be utilized wherever trees, shrubs or groundcovers are irrigated.
28. Irrigation systems shall be designed and equipment selected and maintained to provide a distribution uniformity not less than 85% for drip irrigation, 70% for rotors, and 60% for spray heads.
29. Where pressure exceeds manufacturers recommendations, pressure regulating nozzles are required on spray heads.

K. **Irrigation Schedules**

1. Irrigation scheduling shall incorporate the use of evapotranspiration data or soil moisture data to apply the appropriate levels of water for different climates and regions.
2. Landscape irrigation shall be scheduled between 7:00 P.M. and 10:00 A.M. to avoid irrigating during times of high wind or high temperature.
3. Automatic controllers shall be set to water between 7:00 P.M. and 10:00 A.M. Night time and early morning irrigation will reduce evaporation losses.
4. To improve irrigation efficiencies, irrigation schedules shall be set according to plants actual water needs.
5. A clear understanding of sprinkler precipitation rates and regular monitoring of the evapotranspiration rates (ET rates) are essential for efficient water management. The following schedule shows how many inches of water turfgrass needs monthly, based upon climatic data for the county area:

Month	Inches / Month			
Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

Contact the (Department of Water Supply Water Resources & Planning Division Conservation

Section ? Arborist Committee ???) at _____ for more information.

6. Parks, Golf Courses, Cemeteries, School Grounds and other large landscapes using private wells shall report water usage to the County Department of Water Supply on a monthly basis.
7. Parks, Golf Courses, Cemeteries, School Grounds, and Sports Arenas , though exempt from turf limitations, shall in no circumstance exceed the maximum water allowance for 100% cool season turf.

L. Runoff and Overspray

1. Soil types and infiltration rates shall be considered when designing irrigation systems.
2. All irrigation systems shall be designed to avoid runoff, low head drainage, over spray or other considerations where water flows onto adjacent property, non-irrigated areas, walks, roadway, structures or drain-ways.
3. Proper irrigation equipment and schedules, including features such as repeat cycles, shall be used to closely match application rates to infiltration rates therefor minimizing runoff.
4. Sprays shall not be used in areas less than eight feet wide.
5. Drip and bubbler systems shall not exceed 1.5 gallons per minute per device.
6. Water shall be applied such that no run-off occurs
7. Water application per cycle shall match soil absorption rates. Avoid runoff by discontinuing the application of water as soon as it occurs. Watering in stages can allow water to soak in between applications, thus improving the efficiency of water use.
8. No overhead sprinkler irrigation systems shall be installed in median strips less than 8 feet wide.
9. Conventional sprinklers shall not be used where the perimeter to area ratio (P/A) exceeds 0.25.
10. Drip, low volume spray, or high uniformity rotary nozzles should be used to minimize run-off
11. Sprinkler heads with a precipitation rate of 0.85" per hour or less shall be used on slopes exceeding 15% to minimize run-off, or exceeding 10% within 8 feet of hardscape.
12. Special attention shall be given to avoid run-off on slopes and to avoid overspray in planting areas with a width less than 8 feet and in median strips.
13. Turf grass perimeters shall be minimized to improve irrigation efficiency. Long narrow strips of turf grass such as traffic medians and areas between curbs and sidewalks are not permitted.
14. Sprinkler head spacing shall be designed for head to head coverage. The system should be designed for minimum runoff and over-spray onto non-irrigated areas.

M. Meters

1. Separate landscape water meters shall be installed for all projects except

for single family homes or projects with a landscaped area of less than 10,000 square feet.

N.

Maintenance

1. Landscapes shall be maintained to insure water efficiency. A regular maintenance schedule shall include but not be limited to checking, adjusting and repairing irrigation equipment; resetting automatic controllers, aerating and dethatching turf areas, replenishing mulch, soil amending, fertilizing, pruning and weeding in all landscape areas.
2. Whenever possible, repair of irrigation equipment shall be done with the originally specified materials, their equivalents, or compatible materials of greater efficiency.

O.

Landscape Irrigation Audits

1. The application packet of non-residential landscapes or residential projects involving common landscaping shall provide for landscape irrigation audits to be conducted by certified landscape irrigation auditors at least once every five years.
2. All new non-residential developments, or residential developments with common with landscaped areas greater than two acres are required to have a landscape audit prior to (release of bond and) close of sale.
3. All existing landscaped areas to which the County provides water which exceed one acre, including golf courses, green belts, common areas, multi-family housing, schools, businesses, parks, cemeteries, hotels, motels, and publicly owned landscapes shall have a landscape irrigation audit at least once every five years. Until such time as Hawaii has an established landscape water audit program, *these audits shall reference and be in accordance with the standards set in California's Landscape Water Management Program as described in the landscape auditor handbook, the entire document of which is hereby incorporated by reference?*

L.

Public Education

1. Information on conservation which is provided by County agencies during the permit process shall be provided by consultants and representatives to each affected applicant.
2. New development shall provide information to all buyers or long-term leaseholders regarding the design, installation and maintenance of water efficient landscapes.
3. For all development projects of eight or more homes, at least one model home that is landscaped shall demonstrate via signs and information the principles of water efficient landscapes described in this ordinance.
4. Signs shall be used to identify the model as an example of the water efficient landscape and featuring elements such as hydrozones, irrigation equipment and others which contribute to the overall water efficient theme.
5. If a residential development has one or more model homes, it is required that at least one model home in the development be planted with non-invasive drought tolerant plants and a maximum of 25% turf or water area.
6. Developers shall provide buyers with sample landscape plans using non-invasive plants adapted to the natural rainfall of the area.

7. The developer shall also provide information about water conservation by distributing pamphlets to buyers regarding this subject. Such pamphlets are now available from the Maui County Department of Water Supply and other agencies. Landscape plans and literature distribution shall be included in the application packet and shall require prior approval by the Department of Water Supply (or Planning Dept or Arborist Committee).

M.

Certification

1. A licensed landscape architect or contractor, certified irrigation designer, or other licensed or certified professional in a related field shall conduct a final field observation and shall provide a certificate of substantial completion to the County. The certificate shall specifically indicate that plants were installed as specified, that the irrigation system was installed as designed, that an irrigation audit has been performed, and provide a list of any observed deficiencies.

N.

Prevention of Water Waste

1. This ordinance is intended to prevent water waste, and is not intended to supercede existing County provisions regarding prohibition of Water Waste.
2. Irrigation systems shall be designed, installed, operated and maintained so as to prevent run-off, overspray, or low-head-drainage, including but not limited to :
 - a. landscape water which is applied in such a manner rate and or quantity that it overflows the landscaped area being watered and runs onto adjacent property or public right-of-way;
 - b. landscape water which leaves a sprinkler, sprinkler system or other applicaiton device in such a manner or direction as to spray onto adjacent property or public right-of-way;
 - c. washing of vehicles, equipment or hard surfaces such as parking lots, aprons, pads, driveways or other surfaced areas when water is applied in sufficient quantity to flow from that surface onto adjacent property or the public right of way;
 - d. water applied in sufficient quanitty to cause ponding on impervious surfaces.
3. No person, firm, corporation or government agency shall waste, cause or permit to be wasted any water.
4. No person, firm, corporation or government agency shall cause or permit the flow of fugitive water onto adjacent property or public right of way, except as resulting from fire-fighting, system flushing or other public need or public facilities maintenance need.
5. No person, firm, corporation or government agency shall utilize potable water for construction dust control.
6. No person, firm, corporation or government agency shall utilize misters except as specifically permitted by ____? *(create any provisions to allow these or simply prohibit ?)*
7. No property holder's association may establish criteria for landscaping that prohibits owners from removing turf grass and installing water-efficient landscaping in compliance with these provisions.

8. Even where hand watering is employed, over-watering as evidenced by soggy soils, continually wet pavement, standing water, run-off into streets or other hardscape shall be prevented and shall be considered a violation of this ordinance.

VII. Landscape Documentation Package and Application

Each landscape to which this ordinance applies shall be required to submit a landscape documentation package and application, which shall consist of the following:

- A. A water conservation **design concept statement**, which shall include
 1. whether the application uses the water allowance method or turf restriction method,
 2. project location physical address and tax map key
 3. project application numbers (building permit number, subdivision number, change in zoning application number, or etc.)
 4. name of owner/applicant
 5. name of landscape designer / irrigation designer / installation contractors
 6. brief description of the project
 7. checklist indicating which of items b through k below are included in the packet
- B. A landscape **design plan**, which shall include:
 1. plant materials list
 2. designation of hydrozones
 3. description of water features
 4. property lines and street names
 5. streets, driveways, walkways and other paved areas
 6. pools, ponds, water features,
 7. structural features such as retaining walls
 8. natural features such as rock outcroppings, existing trees to be retained, shrubs that will remain, natural water bodies or other features.
 9. tree staking, plant installation and soil preparation details
 10. calculation of total landscaped area
 11. designation of recreational areas
- C. A **grading design plan** shall be drawn on the same scale as the landscape design plan and irrigation design plan, and shall include:
 1. finished configurations and elevations of landscaped areas
 2. height of graded slopes
 3. drainage patterns
 4. pad elevations
 5. finish grade lines
- D. A **soils analysis**
 1. determination of soil texture, and percent organic matter
 2. approximate infiltration rate
 3. pH
 4. total soluble salts
 5. description of mulch treatments proposed
- E. A proposed **vegetation inventory**
 1. plant materials list divided into hydrozones
- F. An **irrigation design plan**, which shall be consistent with hydrozones indicated

in the landscape design plan, and shall include:

1. information on slopes, soil characteristics and other features pertinent to run-off
2. irrigation efficiency calculations indicating that irrigation efficiency is a minimum of 0.7 efficiency
3. equipment information on type, manufacturer, model and design criteria for equipment including but not limited to:
 - a. meters
 - b. controllers
 - c. valves
 - d. sprinkler heads
 - e. rain sensing shut-offs or over-ride devices
 - f. moisture sensing devices
 - g. backflow prevention devices

G. **Irrigation design plan drawings** at the same scale as the landscape design plans, which clearly indicate:

1. location and size of separate meters for the landscape
2. location, type and size of all components of the irrigation system, including
 - a. automatic controllers
 - b. main and lateral lines
 - c. valves
 - d. sprinkler heads
 - e. moisture sensing devices
 - f. rain switches
 - g. quick couplers
 - h. backflow prevention devices
 - i. static water pressure at the point of connection to the public water supply
 - j. flow rates in gallons per minute, precipitation rates in inches per hour and design operating pressure (psi) for each station.
 - k. recycled water systems

H. **Irrigation schedules**, which shall include

1. total amount of water recommended for the established landscape, not to exceed the maximum water allowance.
2. annual irrigation program with monthly irrigation schedules during the plant establishment period, for the established landscape, and for any temporarily irrigated areas
3. run-time in minutes per cycle, number of cycles per day, and frequency of irrigation for each station
4. the amount of water in gallons recommended on a monthly and annual basis.
5. the amount of water required for any water features, which shall be considered as high use hydrozones, and not as hardscape
6. clear delineation of any high water use zones or sub-areas that will require irrigation above the maximum water allowance.
7. cite the reference used for evaporation or evapotranspiration data

I. The **Calculation** of the maximum water allowance

$$MWA = (ET_o)(0.8)(LA)(0.62)$$

where:

MWA =Maximum Water Allowance

ET_o = Reference Evapotranspiration

0.8 = ET Adjustment Factor

LA =Landscaped Area (square feet)

0.62 = conversion factor (to gallons per square foot)

J. A **maintenance schedule**, to include

1. irrigation equipment
2. automatic controllers
3. aerating and dethatching turf
4. replenishment of mulch
5. mowing heights for turf
6. fertilizing
7. pruning
8. weeding
9. pest control if applicable
10. visual inspections as needed
11. cleaning of filters as needed
12. flushing of lines
13. calibration of rain gauges

K. An **irrigation audit schedule**

1. to be performed by a certified landscape professional

L. A **certificate of substantial compliance**

1. inspected and stamped by licensed or certified professional landscape architect, irrigation auditor, or etc.
2. submitted to (County Dept of Water Supply , arborist committee? , planning Dept?) and the owner.
3. sample (to be attached)

VIII. Enforcement

A. Inspection

1. Certificate of compliance notwithstanding, the County shall have the right to inspect new developments for compliance prior to granting final approvals.
2. Inspection for new development or other inspection shall be carried out with due regard for the convenience and schedule of the owners, the privacy of the occupants, and shall be during business hours unless requested otherwise by the landscape owner and approved by the Department Director.
3. Where consent to an inspection has been refused, or has been unobtainable within a reasonable period of time, OR where a report of violation has been made to the County, the County shall have the right to make un-announced inspection. Such inspection shall be during normal business hours and shall be conducted with due regard for the privacy of occupants.

B. Penalties

1. Any responsible party found to violate the provisions of this ordinance shall be subject to progressively higher fees, leading to to County-installed flow restriction and ultimately to meter removal.
2. In lieu of paying fees for first and second violations only, the responsible party may elect to have a landscape water audit performed by an authorized landscape irrigation auditor, *(to be conducted in accordance with the current edition of the landscape auditors handbook)*. The audit must be performed within 30 days of the violation notice, and the recommendations of the audit must be implemented within 60 days of the violation notice. If these deadlines are met, the fees for violation will be waived. As of the third violation on a premise, the responsible party will be required to have an audit, implement the audit AND pay the fees.
3. For the purposes of assessing fees or flow restriction for violations, any previous violation shall not be considered if a period of five years has elapsed since the last violation was incurred, or the property is acquired by a new owner.
- 4.

IX. Fees

A. The schedule of fees for review and approval of the Landscape Documentation Package shall be as follows:

1.	1/4 acre to 1 acre	\$ 50
2.	>1 acre to 2.5 acres	\$ 75
3.	>2.5 acres to 5 acres	\$ 100
4.	>5 acres to 10 acres	\$ 125
5.	>10 acres to 25 acres	\$ 150
6.	>25 acres to 50 acres	\$ 175
7.	>50 acres to 100 acres	\$ 200
8.	>100 acres to 1000 acres	\$ 250
9.	>1000 acres	\$ 500

B. The schedule of fees for violation of this ordinance shall be as follows:

1.	First Violation	\$ 100
2.	Second Violation	\$ 500
3.	Third Violation	\$1,500
4.	Fourth Violation	\$2,000
5.	Fifth Violation	\$2,500
6.	Sixth Violation	\$3,000
7.	Seventh Violation	\$3,500
8.	Eighth Violation	\$4,000
9.	Ninth Violation	\$5,000
10.	Tenth Violation	\$6,000
11.	Eleventh Violation	\$7,000 plus Flow Restrictor on Property
12.	Twelfth Violation	\$8,000 plus Removal of Meter Until Payment and Correction of Violations

X. References - (to be attached or to be developed)

A. Effective Precipitation (charts/maps/calculation guidance/disclosure forms)

- B. Reference Evapotranspiration (chart/maps/calculation guidance/disclosure forms)
- C. Plant Factor Category Description and Plant List (chart, table, irrig needs, water use factors, etc.)
- D. Landscape Documentation Package and Application Form
 - 1. A water conservation design concept statement checklist
 - 2. A landscape design plan checklist
 - 3. A grading design plan checklist
 - 4. Soils analysis contacts and information
 - 5. An irrigation design plan checklist
 - 6. References for evaporation or evapotranspiration data
 - 7. References for plant materials and their water needs.
 - 8. A sample worksheet for calculation of the maximum water allowance
 - 9. A maintenance schedule checklist
 - 10. An irrigation audit schedule checklist
 - 11. A certificate of substantial compliance to be filled out by certified professional.
- E. Landscape Technical Manual

XI. Landscape Auditor Training and Certification Program

