



# MARIN MUNICIPAL WATER DISTRICT TIER 4 EXEMPTION APPLICATION CHECKLIST

**FOR MMWD USE ONLY**

PASSED INSPECTION

DATE \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

SERVICE NO. \_\_\_\_\_

To be eligible for an exemption from the Tier 4 water rate for a two-year period (i.e., to be billed at the Tier 3 rate), you must meet **all** of the following conservation elements as detailed in the Tier 4 Exemption Checklist, which must be confirmed by an “initial” verification inspection, performed by Marin Municipal Water District (MMWD) staff. Upon passing the verification inspection, your Tier 4 Exemption is valid for two years and you must reapply for subsequent Tier 4 Exemptions for continued eligibility.

### COMPLETING THE CHECKLIST

- Please put a check mark (✓) in the box (☐) to the left of each of the 15 required elements, indicating that you have complied with that requirement.
- Sign and date the Tier 4 Exemption Application Checklist and mail it back to MMWD, after which you will be contacted to schedule an inspection appointment.
- Upon passing your “initial” verification inspection, you will be formally granted a two-year Tier 4 Exemption status.
- If our verification inspection(s) reveal that you did not satisfy the checklist requirements, your Tier 4 Exemption status will be revoked and you will be billed at the Tier 4 rate for any applicable billing cycles.

### TIER 4 EXEMPTION CHECKLIST:

#### LANDSCAPING AND IRRIGATION SYSTEMS



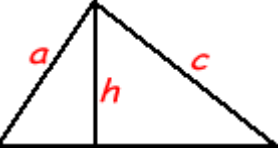
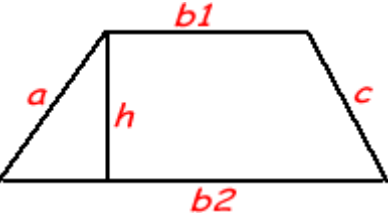

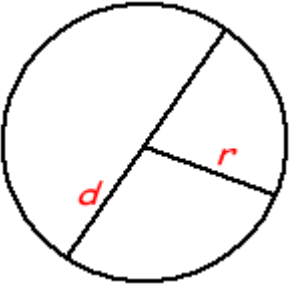
- High-water-use plants and water features are not to exceed 10% of the total developed landscape area with the total amount of turf, in no case, exceeding 5,000 square feet.
- All exposed non-turf soil surfaces are to possess a minimum two-inch layer of mulch.
- Overhead irrigation systems are to possess the following:
  1. An operational distribution uniformity<sup>1</sup> of 60% for turf and 50% for non-turf plantings;
  2. Spray heads located to prevent over spray/run-off; and
  3. Matched precipitation rates within each valve circuit.
- Separate irrigation valve circuits are to exist for the following conditions:
  1. Turf;
  2. High-water-use plants;
  3. Low-water-use plants;
  4. Areas with overhead irrigation;
  5. Areas with low-flow point application; and
  6. Areas with different microclimates.
- Check valves are installed to prevent low-head drainage.
- Installation of a weather based or soil-moisture based self adjusting irrigation controller.
- Low-flow point application or sub-surface irrigation is to be installed in lieu of overhead irrigation for the following conditions:
  1. Angle of slope (exceeds 45%);
  2. Widely spaced plants; and
  3. Soils with poor infiltration rates.
- A sub-meter at each irrigation point of connection, which is the location where an irrigation system or remote control valve(s) is connected to a water supply.
- An irrigation valve site map detailing valve locations, gallons-per-minute demands, precipitation rates, plant types within valve circuits, and operating pressure requirements for each valve, is to be located inside each irrigation controller and is to be protected from deteriorating.

**FOR MMWD USE ONLY**

1 <sup>st</sup> Insp.	1 <sup>st</sup> Flwup	2 <sup>nd</sup> Flwup
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## Exhibit "A" - Measurement Formulas

Shapes	Formula
	<p><b>Rectangle:</b>            Area = Length X Width  <math>A = lw</math></p> <p>Perimeter = 2 X Lengths + 2 X Widths  <math>P = 2l + 2w</math></p>
	<p><b>Parallelogram</b>            Area = Base X Height  <math>a = bh</math></p>
	<p><b>Triangle</b>            Area = 1/2 of the base X the height  <math>a = 1/2 bh</math>            Perimeter = <math>a + b + c</math>            (add the length of the three sides)</p>
	<p><b>Trapezoid</b>  </p> <p>Perimeter = area + <math>b1 + b2 + c</math>  <math>P = a + b1 + b2 + c</math></p>
	<p><b>Circle</b> The distance around the circle is a circumference. The distance across the circle is the diameter (d). The radius (r) is the distance from the center to a point on the circle. (Pi = 3.14)  <math>d = 2r</math>  <math>c = \pi d = 2 \pi r</math>  <math>A = \pi r^2</math>            (<math>\pi=3.14</math>)</p>

## Exhibit “B” – Plant Definitions

**High-water use plants:** High-water using plants are characterized by:

- high transpiration rates;
- shallow rooting;
- the need for frequent watering during summer months or with exposure to hot and drying climatic conditions;
- annuals; or
- plants in containers;
- plants not on MMWD’s list of low-water-use plants (see water wise plant list at [www/marinwater.org/water-conservation/residential/waterwise-plants](http://www.marinwater.org/water-conservation/residential/waterwise-plants)) or identified on East Bay Municipal Water District’s list of low-water-use plants.

**Hydrozones:** A distinct grouping of plants that have similar water needs and climatic requirements. Hydrozone types include, but are not limited to:

- turf;
- high-water-use plants;
- low-water-use-plants;
- microclimates (i.e., sun or shade, southern or northern exposures surrounded by highly reflective surfaces);
- partially hardscaped areas with plants; and
- plants around pool areas and water-use features.

## Exhibit "C"

### "EXAMPLE" - IRRIGATION VALVE SITE MAP DETAILING VALVE LOCATIONS

Valve Circuit #	Location of Valve	*Plant Type	Area (Sq. ft.)	Irrigation Method	GPM	Precipitation Rate	OPERATING PRESSURE
1	North side of house	HW	522	Spray	11.5	2.12	45
2	North side of house	HW	275	Bubbler	5.5	1.93	35
3	North side of house	HW	80	Bubbler	8	3.61	35
4	North side of house	CST	496	Spray	16	3.11	45
5	South side of garage	LW	844	Spray	27.5	3.14	45
6	South side of house	CST	1600	Spray	32	1.93	45
7	West side of driveway	LW	1040	Drip	3.46	0.21	25
8	Patio area	LW	600	Drip	2.45	0.26	25
9	Swimming pool area	LW	724	Drip	2.78	0.24	25
10	East side of driveway	LW	1852	Drip	5.82	0.20	25
11	Front of house	LW	780	Drip	3	0.24	25
12	Front of house	LW	548	Drip	1.89	0.22	25
			<b>9,361 Total Sq. Ft.</b>			<b>119.9</b>	
<b>TOTAL GALLONS PER MINUTE</b>							

\* HW= High Water Use Plants

\*LW= Low Water Use Plants

\*CST= Cool Season Turf

### "EXAMPLE" - HYDROZONE CALCULATION SUMMARY TABLE PER IRRIGATION POINT OF CONNECTION (P.O.C.)

P.O.C. #1

Hydrozone Description	Total Sq. Ft.	% of Landscape
1. CST	2,096	22%
2. HW	877	9%
3. LW	6,388	69%
<b>TOTALS</b>	<b>9,361</b>	<b>100%</b>

**(This map must we weatherproofed)**

## Exhibit “D” - Valve Circuit Precipitation Rate Calculation Sheet

Please show your calculations for determining Precipitation Rates (PR) for each valve circuit in the space provided on worksheet. If methodologies other than the formulas shown below were used in calculating the PR for individual valve circuits, please indicate and submit those calculations.

### PRECIPITATION RATE (PR) (Area Flow Formula)

**For Overhead Irrigation  
or Point Application (Drip) with 100% Coverage:**

$$PR = \frac{96.3 \times \text{Total GPM}}{\text{Total Area}}$$

Sample:

$$PR = \frac{96.3 \times 30 \text{ GPM}}{500 \text{ square feet}}$$

$$PR = 5.78$$

**For Point Application Irrigation  
or Point Application with station planting:**

$$PR = \frac{96.3 \times \text{Total GPM}}{\text{Total Area} \times .65^*}$$

Sample:

$$PR = \frac{96.3 \times 1.66 \text{ GPM}}{500 \times .65}$$

$$PR = \frac{159.86}{325}$$

$$PR = .49$$

\*.65 is based on the assumption the total landscaped area will not be under irrigation due to wider spacing of plants (only 65% will be under irrigation). This number may be manipulated to reflect individual conditions.

Where:

- PR = Precipitation Rate (inches per hour)
- Total GPM = Total flow of water in a valve circuit expressed in gallons per minute
- Total Area = The total irrigated landscape area expressed in square feet (.65 = 65% of landscaped area)
- 96.3 = Constant for conversion of flow and area into common units



## **EXHIBIT “E”**

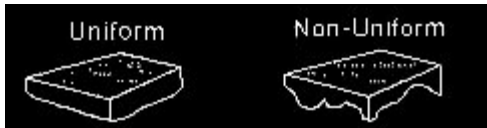
### **LANDSCAPE/IRRIGATION TERMINOLOGIES AND CONCEPTS**

#### **Distribution Uniformity**

One of the most important characteristics of an efficient irrigation system is making sure it is designed and maintained to distribute water as uniformly as possible. The main problem with a non-uniform system is that when dry spots occur, the system is usually run for longer amounts of time to adequately irrigate these dry spots. However, this results in over-irrigation of the rest of the lawn.

A well-designed system using modern equipment should have a distribution uniformity of 80-85%. Lower uniformity indicates a problem with the irrigation system that dramatically increases water use.

#### **Water Depths in Soil after Irrigation**



The most common causes of poor distribution uniformity include:

- Mismatched precipitation rate sprinkler heads/nozzles;
- Improper operating pressure; or
- Broken or leaking equipment.

Distribution uniformity is also negatively affected by:

- Poor spacing of sprinkler heads;
- Mixed equipment types;
- Improper installation;
- Plant material interfering with sprinklers;
- Watering during high wind conditions;
- Clogged or worn nozzles; or
- Improper sprinkler head selection (spray, rotors, impact, etc.).

## **Mismatched Precipitation Rates**

A common problem contributing to low distribution uniformity is sprinklers with mismatched precipitation rates. Precipitation rate refers to the amount of water a sprinkler head delivers over a period of time, generally given in "inches per hour." Precipitation rates greater than 1.0 inches per hour are considered high; 0.5 to 1.0, moderate; and less than 0.5, low. Sprinkler heads are designed to operate as matched sets to ensure optimum uniformity. An irrigation system with heads having identical precipitation rates is referred to as having a "matched" precipitation rate. Matched precipitation rates minimize excessively wet and dry areas in the landscape.

## **Improper Operating Pressure**

High water pressure is one of the most common problems of irrigation systems. It causes damage to the system, contributes to poor uniformity and ultimately results in poor plant appearance. Where operating water pressure is too high a pressure regulator becomes necessary to ensure the irrigation system will function as intended by the manufacturer.

## **Broken Irrigation Equipment**

Water loss from broken sprinkler heads is a major problem in many irrigation systems. A broken head often results in a geyser that damages the surrounding landscape through erosion. Breaks also rob the system of pressure, resulting in under application of water to other areas of the landscape.

## Exhibit F – Irrigation Sub Meter



## Exhibit "G" – Rain Shut Off Device

