

## Irrigation Application - Instructions

Water Regulation Bylaw 10480 section 4.4.2 requires that a property owner must make application to the City to install any new or Renovated Landscape Irrigation System as set out in section 4.4.3. Irrigation installations less than 100 sq.m. in area or serving farm crops are exempt from application requirements. For Questions on completing this application refer to Kelowna's Water Smart Web site "[Calculate Your Savings](#)" or call 250 469-8502.

Schedule C of the Water Regulation Bylaw 10480 provides the scope of information that is required in applications for new or renovated irrigation systems in the City of Kelowna Water Utility area. Applicants are required to submit three components for review and approval by the City (see **Irrigation Permit Application**):

1. Project and Applicant Identification
2. Landscape Water Conservation Checklist
3. Landscape Water Conservation Calculation Table

### **Project and Applicant Identification**

Applicants may be the **Property** owner or an agent appointed by the **Property** owner with authority to commit the Owner to meet the requirements of the bylaw. Applicants shall provide their contact information and be available to liaise with the **City** throughout the design and landscape construction period.

### **Landscape Water Conservation Checklist**

Applicants shall complete the attached Landscape Water Conservation Checklist to identify and confirm that the project will conform to current landscape and irrigation water conservation practices listed in the checklist. Applicants should use the Notes section to explain unchecked clauses, if any. The **City** may require additional information or refuse permit approval based on its review of the application checklist completion and comments.

### **Landscape Water Conservation Calculation Table**

Applicants shall complete a Landscape Water Conservation Calculation Table. Applicants may choose from one of two methods: the Spreadsheet Method or the Manual Method.

**Spreadsheet Method:** A Landscape Water Conservation Calculation Spreadsheet will be made available from **City** staff to allow the applicant to enter project information which will enable the spreadsheet to calculate the **Landscape Water Budget (WB)**, the **Estimated Landscape Water Use (WU)**, and the difference between them (see **Irrigation Permit Application (Excel)**).

The Landscape Water Conservation Calculation Spreadsheet embeds the formulas shown in this Schedule C, and is available in MS Excel format, separately. Applicants using the spreadsheet method may be able to refine values for Plant Factor (PF), Irrigation Efficiency (IE) and Reference Envirotranspiration (ET<sub>o</sub>), subject to approval of the **City**.

**Manual Method:** Using the **Irrigation Permit Application (PDF)**, applicants may manually fill in and calculate the **Landscape Water Budget (WB)**, the **Estimated Landscape Water Use (WU)**, and the difference between them.

In both cases the applicant needs to design and supply the areas of various landscape treatments and the cumulative total landscape area of the project. Projects below the minimum area stipulated in the Water Regulation Bylaw do not require an application or permit.

It is the responsibility of the Applicant or their representative(s) to create a calculation and installed system that meets the requirements of the Water Regulation Bylaw, including that the **Landscape Water Budget (WB)** must exceed the **Estimated Landscape Water Use (WU)** for the system design, installation and operation.

## Irrigation Application - Interpretation

**Landscape area:** means all of the planting areas, turf areas, pervious paving, water features and unirrigated pervious surfaces - such as existing or planted native vegetation, spaced wood deck, stone or organic mulch - in a landscape design plan subject to the **Landscape Water Budget** calculation. The landscape area does not include footprints of buildings or structures, impervious sidewalks, impervious driveways or parking lots, impervious decks or patios, other impervious hardscapes.

**Pervious:** means surfaces that allow water to soak into the underlying ground and do not create runoff when exposed to up to the mean annual rainfall.

**Impervious:** means surfaces that shed water and create runoff when exposed to rainfall events of 1 mm or greater.

**Special landscape area (SLA):** for all calculations, means an area of the landscape dedicated solely to edible plants, areas irrigated with recycled water, and water features using recycled water, captured rainwater, or other non potable water source. For calculations in multiple family, park and playground areas, but not for single family lots, Special Landscape Area may also include areas dedicated to active play such as park lawns, sports fields, golf courses and where turf provides an intensively used playing surface.

**Water feature:** means a designed element where open water performs an aesthetic or recreational function. Water features include ponds, lakes, waterfalls, fountains, artificial streams, spas and swimming pools (where make-up water is supplied from the municipal potable system).

**Hydrozone:** means a portion of the landscaped area having plants with similar water needs. A hydrozone may be irrigated or non-irrigated.

- Unirrigated pervious paving, spaced wood deck or other pedestrian, decorative or driveway surfacing that allows rainwater to soak into underlying ground without puddling shall be included in total landscaped area calculations and shall be in a no water use hydrozone.
- All water feature surface areas shall be included in the high water use hydrozone.
- Areas with temporary irrigation for a maximum 1 year plant establishment period shall be included in the no water use hydrozone.
- Individual hydrozones that mix high and low water use plants shall not be permitted.
- Individual hydrozones that mix plants of moderate and low water use or moderate and high water use may be allowed if:
  - Plant factor calculation is based on the proportions of the respective plant water uses and their plant factor, or
  - If the plant factor of the higher water using plant is used for calculations.

**Plant factor or plant water use factor (PF):** means a factor, when multiplied by the Reference Evapotranspiration (ET<sub>o</sub>) that estimates the amount of water needed by plants. For the purposes of these standards plant factor ranges are as follows as described in the "Watering" section on page 161 in *Western Garden Book* \*.

- Empty water droplet - Low water use = 0.3
- Half-filled water droplet - Medium/ moderate water use = 0.5
- 1, 2 or 3 full, water droplets - High water use = 0.7

\* Norris Brenzel, Kathleen, ed. *Western Garden Book Seventh Edition*. Menlo Park: Sunset Publishing Corporation, 2001.

**Irrigation efficiency (IE):** means 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 average irrigation efficiency for purposes of these standards is 0.7, with the corresponding requirement that installations meet all the clauses in the Landscape Water Conservation Checklist and in the irrigation manufacturer's design and installation specifications.

**Evapotranspiration rate:** means the quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specified time.

**Reference evapotranspiration (ETo):** means a standard measurement of environmental parameters which affect the water use of plants. ETo is given in millimeters per day, month or year and is an estimate of the evapotranspiration of a grass reference crop using a modified Penman Monteith equation, which is the standard method recommended by the UN Food and Agriculture Organization. Reference evapotranspiration is used as the basis of determining the **Landscape Water Budget** so the regional differences in climate can be accommodated. For purposes of calculations in the City of Kelowna, use 1000 litres/year, or the applicant may use more precise amounts derived from the Farmwest.com Evapotranspiration Calculator ([www.farmwest.com](http://www.farmwest.com)) for the location of the project in Kelowna (Airport, East Kelowna or South Kelowna).

**ET adjustment factor (ETAF):** means a factor of 1.0, that, when applied to a reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape. A combined plant mix with a site-wide average of 0.71 is the basis of the plant factor portion of this calculation. For purposes of the ET adjustment factor, the average irrigation efficiency is 0.71. Therefore, the ET adjustment factor  $(1.0) = (0.71/0.71)$ .

- ETAF for special landscape area (SLA) shall not exceed 1.3.
- ETAF for existing, non-rehabilitated landscapes is 1.0

#### Landscape Water Budget (WB)

*The project's Landscape Water Budget shall be calculated using this equation:*

$$WB = ETo[(1.0 \times LA) + (0.3 \times SLA)] / 1000$$

*where:*

*WB = Maximum Landscape Water Budget (cubic metres per year)*

*\*ETo = Reference Evapotranspiration (use approx. 1000 millimetres per year in Kelowna, or more specific data from [www.farmwest.com](http://www.farmwest.com))*

*1.0 = ET Adjustment Factor (ETAF)*

*LA = Landscaped Area includes Special Landscape Area (square metres)*

*SLA = Portion of the landscape area identified as Special Landscape Area (square metres)*

*0.3 = the additional ET Adjustment Factor for Special Landscape Area  $(1.3 - 1.0 = 0.3)$*

*/1000 = divide total calculation by 1000 to convert to cubic metres/year*

#### Estimated Landscape Water Use (WU)

*The project's Estimated Water Use in the landscape is calculated using the following formula:*

$$WU = ETo(PF \times HA/IE)/1000$$

*where:*

*WU = Estimated Landscape Water Use per year (cubic metres per year)*

*ETo = Reference Evapotranspiration (use approx. 1000 millimetres per year in Kelowna, or more specific data from [www.farmwest.com](http://www.farmwest.com))*

*PF = Plant Factor*

*HA = Hydrozone area [high, medium, low and no water use areas] (square metres)*

*IE = Irrigation efficiency (minimum 0.7)*

*/1000 = divide total calculation by 1000 to convert to cubic metres/year*