Memo

Date: Mar 18, 2011

File: 5600-1 Water Sustainability

To: City Manager

From: Don Degen, Utility Services Manager

Subject: Landscape and Irrigation Standards - Water Sustainability Action Plan

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Recommendation:

THAT Council receives, for information, the Report from the Utilities Services Manager dated March 18th, 2011 recommending that Council adopt a new Water Regulation Bylaw and amend the Subdivision, Development & Servicing Bylaw No. 7900;

AND THAT Bylaw No. 10480, being Water Regulation Bylaw be forwarded for reading consideration;

AND THAT after final adoption of Bylaw No. 10480 being Water Regulation Bylaw, Council repeal Bylaw No. 2173 being the current Water Regulation Bylaw and rescind Council Policy No. 325, being Hydrant Use Policy;

AND THAT Bylaw No. 10481, being Amendment No. 14 to the Subdivision, Development & Servicing Bylaw No. 7900 be forwarded for reading consideration;

AND FURTHER THAT after adoption of Bylaw No. 10481 being Amendment No. 14 to the Subdivision, Development & Regulation Bylaw No. 7900, Council Policy No. 266, being Subdivision, Development & Servicing Approved Products List Policy be revised as outlined in Schedule "A" attached to the Report from the Utilities Services Manager dated March 18th, 2011;

Purpose:

On September 20, 2010, Kelowna Council adopted a resolution to "... direct staff to prepare for Council's consideration and approval amendments to appropriate bylaws and incentive programs to implement Landscape and Irrigation performance standards, specifications and guidelines as outlined ..."

The regulations described here follow from that resolution, and are being submitted for consideration by Council.

Background:

In 2007, City Council adopted a Water Sustainability Action Plan that identified a number of initiatives that would achieve further reductions in water use by 2012 to support the city's commitment to corporate sustainability. Included in this plan were recommendations to implement Demand Side Management (DSM) water use reduction strategies and to link water conservation to development approvals. Water use in Kelowna can more than quadruple during peak summer periods with most of this increase related to outside landscape watering. A significant reduction in water demand can be achieved through more efficient landscape and irrigation practices.

A five year action plan has been established to implement the changes to outdoor water use. The Landscape and Irrigation Action Plan for Water Sustainability, outlined by this report, provides an update on achieving water conservation and shows the current status of actions driven by the action plan. A significant amount of consultation with staff and community stakeholders such as UDI and the Irrigation Association of BC occurred between 2007 and 2010 through a series of workshops and presentations to gain feedback and comment on what will be required to ensure the process is streamlined and will work for all stakeholders. Through this consultation process, a customized landscape and irrigation water conservation approach has been designed to fit with Kelowna's climate and bylaw structure.

At the same time as implementing regulations for water conservation, this report also submits for consideration a suite of changes to the Water Regulation Bylaw, including updates to wording, and integration of related regulations.

Summary of Water Conservation Guidelines and Requirements

The Landscape and Irrigation Guide to Water Efficiency brochure produced in spring 2008 by HB Lanarc Consultants and the City of Kelowna and attached to this report explains practical measures to reduce outdoor water use by 15% to 30% while maintaining highly attractive landscapes.

In addition to creating the Water Efficiency brochure, the action plan calls for a regulatory component to encourage consistent performance across the landscape and irrigation industry.

Both the brochure and the regulations are intended to bring all new urban landscape and irrigation to a level of good current industry practice that includes water conservation. At the same time the objective is to minimize the time and cost associated with compliance.

The bylaw changes draw from the guidelines in the *Landscape and Irrigation Guide to Water Efficiency* brochure with simplified requirements for single family irrigation systems.

Implementation Through Bylaw Updates and Industry / Public Outreach

The bylaw changes would draw from the guidelines in the *Landscape and Irrigation Guide to Water Efficiency* brochure.

The City's water conservation regulations and requirements have three coordinated parts:

- **Single & Two Family Residential:** The need to improve the application of irrigation best practices is greatest in small residential irrigation systems which represent the majority of irrigation water consumption in the City. For irrigation installations at single and two dwelling family properties in the Kelowna Water Utility service area, a simplified and expedient water conservation report and irrigation permit process is provided in the Water Regulation Bylaw. Drawing submittals are not required for this type of application.

- **Subdivision and City Works & Services:** The existing blank 'Boulevard Landscaping' placeholder in the Subdivision, Development and Servicing Bylaw No 7900 is now replaced with a complete 'Landscape and Irrigation' section. Requirements in this addition reduce uncertainty about boulevard and median design, and will save time and duplication of effort by providing standard specifications and details that reflect current landscape and irrigation best practices.

- **Multi-family residential, Commercial, Industrial:** Developments of multi-family residential, commercial, or industrial uses now go through a Development Permit process in most cases. To expedite inclusion of water conservation into Development Permit (DP) approvals, draft language of the proposed new Official Community Plan DP guidelines incorporates water conservation considerations. Under the proposed approval process, one DP approval will deal with both water conservation and other urban design objectives.

Landscape Water Conservation Requirements in the Water Regulation Bylaw

The Water Regulation Bylaw No. 10480 includes basic requirements for water conservation in all new or renovated irrigation installations larger than 100 square metres in area, including those at single family homes.

An application is not required for an outdoor landscape irrigation system on Agricultural properties where water is being supplied for farm purposes (non farm uses will be subject to these water conservation requirements).

For irrigation installations associated with subdivision, works and services, or development permits, the application requirements are City-wide. For other land uses, the requirements of the Water Regulation Bylaw for irrigation applications would apply only to the City of Kelowna Water Utility area.

The Water Regulation Bylaw requires applicants to submit basic landscape and irrigation information in a short Landscape Water Conservation Report, in the form of Schedule C of the bylaw. The application report includes:

- Project and Applicant Identification

- Landscape Water Conservation Checklist: A checklist of current irrigation best management practices that applicants must agree to follow, or must provide a satisfactory explanation of why that practice does not apply to the irrigation system application. A compulsory requirement is to use a 'Smart Controller' that adjusts automatically to weather conditions, and a master irrigation shut-off valve in an outdoor location. For more information see the brochure 'Landscape and Irrigation Guide to Water Efficiency' or the videos on the Water Smart website at www.kelowna.ca .

- Landscape Water Conservation Calculation Table: which calculates the maximum amount of water the proposed landscape area should need per year (a Landscape Water Budget), and also calculates how much water the proposed planting and irrigation design will use (the Estimated Landscape Water Use). The Estimated Landscape Water Use must not exceed the Landscape Water Budget. To expedite calculations, an 'Excel' format spreadsheet is available from the City. See the Water Smart website at www.kelowna.ca for details and video instruction on the Landscape Water Conservation Calculation Table at Calculate Your Savings. For illustration of ways to meet the bylaw water conservation requirements by landscape and irrigation design, see Examples of Success and Design Guidelines.

Subdivision, Development and Servicing Bylaw No 7900

The completion of a new 'Landscape and Irrigation' section of Bylaw 7900 provides a time-saving resource for the development community. This section establishes in bylaw form for the first time City standards for landscape and irrigation on City streets, boulevard, medians, and other lands that will be dedicated to the City through subdivision, development or works and services projects.

The new sections include:

- Landscape and Irrigation Water Conservation Requirements (part 6A of Schedule 4): requiring the use of Qualified Professionals, related drawing and data requirements, and integrating the Landscape Water Conservation Report provisions of the Water Regulation Bylaw, so that the Landscape Water Conservation Report requirements will apply to all subdivision in the City whether in the City of Kelowna Water Utility Area or other areas of the City.

- Landscape Design Standards (part 6B of Schedule 4): identifying permissible landscape treatments for various boulevard and median types, and related design requirements.

- Irrigation Design Standards (part 6C of Schedule 4): providing design requirements for irrigation systems.

- Supplementary Specifications to Master Municipal Construction Documents (MMCD): with new or supplementary sections added for Irrigation System, Topsoil and Finish Grading, Structural Soil, Soil Cells, and Planting of Trees, Shrubs and Ground Covers. Not all sections will apply to all developments.

- Standard Detail Drawings: for typical irrigation and landscape installations.

A key objective of these standards is to provide both water conservation and also landscape and irrigation installations that are readily maintainable by the City over the long term - avoiding substandard installations that lead to high maintenance costs or wasted water. Providing this standard for City projects will also set a level of quality that the private sector could refer to in private landscape and irrigation installations.

Council Policy 266 - Subdivision, Development & Servicing - Approved Products List

This Policy is updated to include new sections for irrigation and wastewater products. The policy specifies approved products that are to be used in the construction of City works and Services.

Development Permit Guideline Refinements (under consideration in the new OCP)

An update to the Official Community Plan will be considered by Council in the near future. As a part of the draft language for that update, landscape water conservation guidelines have been integrated into proposed Section 14: Urban Design in the Comprehensive DP Guidelines. Refer to the OCP website for draft language.

Decisions early in the DP site design process directly affect the amount of water use in the landscape e.g. by designing the proportion of high water use areas like mown lawn vs low water use areas like certain groundcovers. The DP guidelines encourage designers to think about water conservation as they do site plans and landscape concepts. At the same time it is recognized that water conservation is one of many urban design guidelines that are being considered in the DP process.

The provision of the Landscape Water Conservation Report (Schedule C of the Water Regulation) is also coordinated with the DP process, so that one application process incorporates water conservation into the overall development design.

In addition to normal site plans and landscape drawings, the DP will require a hydrozone plan that identifies areas of high, moderate, low or no landscape irrigation use, matched to the landscape planting scheme. An irrigation detail design will also be required by the DP.

Use of qualified professionals is established under the DP, including the requirement to confirm that construction matches the submitted designs.

Council consideration of the Development Permit guidelines will be part of the new OCP, scheduled for Council review in June 2011.

Landscape Water Conservation Process Phase-In, Funding and Support

Implementation of the landscape water conservation requirement (other than Development Permit components) is expected to be in place for the irrigation season of 2011. General steps to implementation include:

- March 1, 2011 release of draft bylaw materials for the Water Regulation Bylaw 10480 and Bylaw 10481, being Amendment No. 14 to the Subdivision, Development & Servicing Bylaw No. 7900, for public review.
- March 1, 2011, public release of web and video training materials and brochure download through the City's website www.kelowna.ca .
- Draft bylaw review workshops and meetings with industry (seven events have been held to date).
- First readings from Council (this report and meeting).
- Finalization of application systems.
- Staff training workshop (four staff sessions have been held to date).

- Phased adoption of bylaw amendments - Water Regulation and Bylaw 7900 revisions need to be adopted first, followed by water conservation components incorporated into the Development Permit guidelines of the new OCP, anticipated in June 2011.
- Pilot project period through 2011 - where applicants are required to use the new system, but where penalties for non-compliance are withheld.
- Fine-tuning of the approvals system, based on the lessons learned in the pilot project period.
- Full compliance 2012, where the bylaws and compliance systems will have full force and effect.
- Irrigation-related applications that are received by Land Use Management or the Development Services group will be referred to Water Smart program staff who will review the landscape water conservation requirements in the application and provide comments.

Water Smart program staff will also work closely with Land Use Management and Development Services staff and serve as the point of contact for discussing any questions related to the irrigation & landscape portion of the application.

Field visits to support compliance will also be completed by Water Smart and complement existing utility customer public outreach and education programs.

Funding for this program currently exists in the Utility Services annual Water Smart program base budget. Application fees could support the ongoing program and public education.

Although the initial application process is likely to be paper-based, in addition to an existing spreadsheet it is proposed that a web-based application process be pursued to streamline the application and approval process. By using current communications technology, as well as integrating with existing approval processes, the overall objective is to minimize costs and avoid delay.

The proposed regulatory changes are one part of a broader Landscape and Irrigation Action Plan for the Water Sustainability program that includes public awareness, outreach, social marketing, awards and related actions that complement the review and regulatory component. As well as the brochure release, there have been seven workshops with the industry. Outreach has been ongoing in early 2011, and includes:

- Facilitation of two recent workshops and a meeting with industry, now that the draft bylaws are available;
- Ongoing distribution of the brochure 'Landscape and Irrigation Guide to Water Efficiency';
- Providing draft of the bylaw technical components, video based instruction material on the guidelines and calculations at the Water Smart page of www.kelowna.ca ;
- Coordinating an information and application process, and related staff and industry training;

Together it is expected these actions will make progress towards a minimum 15% further reduction in outdoor water use by 2012. A review and refinement of the program is recommended in 2012.

Internal Circulation:
Land Use Management
Policy & Planning
Development Services
Design & Construction
Infrastructure Planning
Civic Operations
Community & Media Relations

Legal/Statutory Authority:
Community Charter
Section (8)(3)(a) gives the authority to create the NEW Water Regulation Bylaw No. 10480
Section (194)(1)(a) authority to impose fees in the NEW Water Regulation Bylaw No. 10480

Existing Policy:
Rescind Council Policy No. 325, being Hydrant Use Policy
Amend Council Policy No. 266, being Subdivision, Development & Servicing Approved Products List Policy

Financial/Budgetary Considerations:
Approved funds in the 2011 Budget

Personnel Implications:
Receiving and circulation at One Window.
Land Use Management and Development Engineering will assist in the process
Water Smart program staff will be providing One Window support for applicants

External Agency/Public Comments:
7 workshops have been held with external industry stakeholders and internal staff over the past two years to assist in the development of these standards to include comments and requirements where possible.

UDI supports the need for these standards. Related recommendations include more punitive water rates for higher water users and more emphasis on ways to reduce water consumption for existing residential customers . Concerns also expressed regarding the water use calculations for new residential development. Staff are now working with UDI to pilot test the process and revised water rates will be to council in April of this year

Irrigation Association of BC (IABC)support the need to for landscape and irrigation standards. As part of the program communications plan staff will be working closely with industry representatives to ensure there is clarity with process and requirements.

HBA (Home Builders Association) offered general support

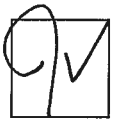
Community & Media Relations Comments:
Staff have developed a communications plan for this program
The Landscape and Irrigation Standards brochure attached was launched in 2010 and has been made available to all internal and external community stakeholders.
Six(6) short segment videos are available on the city web site for information and instructional purpose.

Considerations not applicable to this report: N/A

Alternate Recommendation:N/A
Legal/Statutory Procedural Requirements:N/A

Submitted by:

D. Degen, Utility Services Manager

Approved for inclusion:  J. Vos, General Manager Community Services

cc: Policy & Planning
Land Use Management
Design & Construction Services
Development Services
Development Engineering
Building & Permitting
Park Services Manager
Communications

SCHEDULE "A"

POLICY 266

City of Kelowna
1435 Water Street
Kelowna, BC V1Y 1J4
250 469-8500
kelowna.ca

Council Policy

Subdivision, Development & Servicing – Approved Products List

APPROVED July 29, 2002

RESOLUTION: R375/10/04/26
REPLACING: R602/09/05/25; R59/99/01/25; R651/00/07/24; R650/02/07/29
DATE OF LAST REVIEW: April 2010

This policy specifies the approved products to be used in the construction of Works and Services in the City of Kelowna. This list will be expanded and amended from time to time.

The list is to:

(a) Standardize the products used between Water Improvement Districts and the City.

(b) To limit the number of certain products that can be used within the City, to ensure that staff is trained to maintain those items, and to limit the inventory necessary for maintenance.

(c) Make it easier for contractors and to minimize errors.

The City, subject to recommendation by the Director of Design & Construction, may approve products that satisfy the requirements of the City. For "Water" products, the Kelowna Joint Water Committee establishes the requirements. The respective Civic Operations Managers will review Water, Wastewater, Drainage, Electrical, Parks, and Road and Transportation Products. Requests for product inclusion may be made to the respective ~~Director of Design & Construction~~ Civic Operations Manager.

Table of Contents:

A. WATERWORKS DIVISION

Note: Products must conform to CSA Standard, where applicable.

Legend:
@ Subject to Engineers Design and Approval
# Complete with Stainless Steel or high strength, low alloy steel bolts. All bolts to be denso paste and taped.

Manufacturer	Make/Model	Size Range	Comments/Conditions
1. Pipe			
Water main			
Ipex, Rehau, Royal	PVC C900	100 to 300mm	Only DR 18, class 150 or better as required for C900 & C905
	PVC C905	350 to 900mm	
Canada Pipe,	Ductile C151	250 to 750mm	Must be installed with Polyethylene encasement, and be cement mortar lined to AWWA C-104.
US Pipe	Ductile C151	750mm and up	
Service Pipe			
Noranda, Wolverine	Type k Copper	min. 20mm (3/4") max. 50mm (2")	Must conform to CSA HC.7.6 & ASTM B88
All Suppliers	Polyethylene	min. 25mm (1") max. 50mm (2")	Only Series 160 or 200 conforming to CAN/CSA-B137.1-M All PE: ID must be equivalent to copper tube flow capacity
2. Fittings & Appurtenances			
Fittings			
TC / ACS	Iron	100 – 600 mm	C-153 Fittings only
Norwood Foundry	Iron	100 – 600 mm	C-153 Fittings only
Sigma Corporation	Iron	100 – 600 mm	C-153 Fittings only
Ipex	PVC	100 – 200 mm	DR 18 Class 150, CSA B137.2 & B137.3, AWWA C907
Restraining Joints			
Ford Meter Box Co. / Uni-Flange	1300C, 1350C & 1390C	100 – 600 mm	# @
Smith Blair	Model 982	100 – 600 mm	# @
Sigma	PV – LOC Series	100 – 600 mm	# @
EBAA Iron	Series 1500 PVC	100 – 600 mm	# @
Canada Pipe	Thrust Loc Series	100-600 MM	# @
Sigma	Zip Flange	100 - 600 mm	# @

A.WATERWORKS DIVISION CON'T

Manufacturer	Make/Model	Size Range	Comments/Conditions
Service/Tapping Saddles			
Robar	2606DB	100 – 600 mm	Up to 25mm boss
	2706DS	100 – 600 mm	With stainless steel straps
Canada Pipe	SC-2	100 – 400 mm	Up to 25mm boss With stainless steel straps
Ford	FS303	100 – 300 mm	Up to 25mm boss
	202 BS	100 – 900 mm	With stainless steel straps
Cambridge Brass	812	100 – 900 mm	Up to 25mm boss
Couplings	**Note**: All couplings to be Fusion Bonded Epoxy Coated Ductile Iron.		
Ford	FC1-ESH & FCA-ESH	100 – 600 mm	#
	FC2W Ultra Flex	100 – 300 mm	#
Robar	1506 & 1506R	100 – 600 mm	#
	1726 Multi-Fit	100 – 300 mm	#
Smith Blair	411, 413, 415, 441	100 – 600 mm	#
Canada Pipe	Style CDB	100 – 600 mm	#
Viking Johnson	Maxi-Fit & Maxi-Step	All sizes	#
T.P.S.	Hymax 2000	50 – 600 mm	#
Romac	XR 501 Extended Range	100 – 300 mm	#

3. Valves

Gate Valves			
Clow	Clow Resilient	50 – 600 mm	
Mueller	Super-Seal	50 – 300 mm	
Mueller		AWWA C-515 A2361350 – 1050 mm	
Tapping Saddles			
No fabricated Steele on PVC or AC		All sizes	# Unless approved by Utility or Improvement District
Ok on D.I. or C.I.			
Butterfly Valves			
Centerline	Series 200	350 mm +	
Pratt	Groundhog	350 mm +	
Mueller	Lineseal III	350 mm +	
Keystone	Type AR1 & AR2	350 mm +	

A. WATERWORKS DIVISION CON'T

Manufacturer	Make/Model	Size Range	Comments/Conditions
Air Valves	**Note**: Internal coating to be Factory, NSF approved Epoxy		
Golden Anderson	945 E	25 – 100 mm	Internally Coated
Apco	143C, 145C, 147C 149C & 150C	25 – 150 mm	Internally Coated
Valmatic	201C, 202C, 203C & 204C	25 – 150 mm	Internally Coated
Crispin	All Models	25 – 150 mm	Internally Coated
Cla-Val	All Models	25 – 150 mm	Internally Coated
Service Boxes			
Meuller	A-726	20 – 25 mm	c/w Stainless Steel Rods &
	A-728	37 – 50 mm	SS-RHD or MD-RHD Clevis Ends
Trojan	VSB1	20 – 25 mm	c/w Stainless Steel Rods &
	VSB2	37 – 50 mm	SS-RHD or MD-RHD Clevis Ends
Main Valve Boxes			
TC / ACS		Minimum 375mm	Nelson Type
Norwood Foundry		Vertical Dimension	Nelson Type
Dobney Foundry	D-5		Nelson Type

4. Hydrants

Hydrants

Terminal City	C-71-P		TCH1A only c/w Storz Fitting
Clow	Brigadier		c/w Storz Fitting
Canada Valve	Century		c/w Storz Fitting

5. Brass Service Fittings

Corporation Stops

Mueller	B-25008	20 – 50 mm	Full port only
A.Y. McDonald	4701BQ	20 – 50 mm	Full port only
Ford	FB 1000	20 – 50 mm	Full port only
Cambridge Brass	Series 301	20 – 50 mm	Full port c/w new mueller gasket
Curb Stops	**Note:** Stop & Drains NOT permitted.		
Mueller	B-25209	20 – 50 mm	Full port only
A.Y. McDonald	6100XQ	20 – 50 mm	Full port only
Ford	B44 Series	20 – 50 mm	Only full port models 333, 444, 555, 666 & 777
Cambridge Brass	Series 202	20 – 50 mm	
Service Line Couplers			
Ford	C44 Series	20 – 50 mm	Models C44-1 to C44-88
Mueller	H-15403	20 – 50 mm	H15403, H15404 & H12940
Cambridge Brass	Series 118 & 119	20 – 50 mm	

B.MANHOLES AND CATCH BASINS

1. Adjustable Manhole Frame:
   - TC Ironworks Inc. C44A adjustable MH frame and SR-Support Ring

2. Catch Basin Rollover Frame and Grate:
   - Westview Sales Ltd. RB7 frame and grate

C.MISCELLANEOUS METALS DIVISION

Landscape Products

Dobney Foundry Surrey, BC (604) 596-7407	Tree Grates SP48 Model Grate Colour: Black
Dobney Foundry Surrey, BC (604) 596-7407	Tree Guards Type 'B" Colour: Black
Dobney Foundry Surrey, BC (604) 596-7407	Bollards Style 'B' Colour: Black
Frances Andrews Surrey, BC (800) 656-6579	Bench Model #G24-311M Colour: RAL 5011
Frances Andrews Surrey, BC (800) 656-6579	Garbage Receptacle Model # R-31-1 Colour: RAL 5011

D. IRRIGATION

Manufacturer	Make/Model	Size Range	Comments/Conditions
Isolation Valve, Master Control Valve			
Red & White	256	Up to 2" > 2"	As per Contract Dwgs
Master Valve			
Hunter	IBV Series		
Rain Bird	EFB and BPE Series		
Toro	220 Series		
Pressure Reducing Valve			
Watts	Series 25 AUB-Z3		
Backflow Prevention Device – Double Check Valve Assembly			
Conbraco	40-100 Series		
Watts	Series 709, c/w NRS		
Backflow Prevention Device – Reduced Pressure Backflow Assembly			
Conbraco	40-200 Series		
Watts	Series 909		
Pulse Decoder			
Rain Bird	M51200		
Pulse Output Transmitter			
Data Industrial	600-15		
Rain Bird	PT322		
Electrical Control Valve			
Hunter	ICV c/w Accu-Set		
Rain Bird	PEB c/w PRS-Dial		
Toro	P-220 c/w EZReg		
Control Zone Kits For Drip Irrigation			
Toro			
Rain Bird			
Netafim			
Low Flow Control Valve			
Hunter	ICV series		
Rain Bird	PEB series		
Toro	TPV series		
Low Flow Filter			
Rain Bird	QKCHK		

D. IRRIGATION CON'T

High Flow Filter

Amiad	Plastic filter w/ 130 micron screen	Wired to controller for automatic flush

Quick Coupler Valve

Rain Bird	5-RC

Irrigation Valve Box

Carson Industries LLC	Specifiction Grade
NDS Manufacturing	Pro Series

Wire Splice Box

Carson Industries LLC	Specifiction Grade
NDS Manufacturing	Pro Series

Sprayhead Sprinkler

Hunter	INST-CV series
Rain Bird	PRS-SAM series
Toro	PRX-COM series

Rotor Sprinkler

Hunter series	PGJ, PGP, I-35,
Rain Bird series	3500,5000 plus, 8005
Toro series	Mini 8, 640, T5 with check valve

Drip Emitter/Bubblers

Hunter series
Rain Bird series
Toro series

Wire Splices

3M	DBY Direct Bury Splice Kit

E.WASTEWATER

1. GENERAL

Materials not contained in the "Wastewater Approved Products List" may be accepted on a product by product basis, however approval must be provided from the City. If requested, evidence shall be provided that material complies with the all standard specifications listed in this document. All products must comply with the requirements in the current Master Municipal Construction Documents, and the City of Kelowna Supplementary Specifications.

2. SANITARY SEWER PIPE

All pipes shall be Poly Vinyl Chloride (PVC) CSA approved pipe. Compounds used in manufacturing the pipe shall come from a single manufacturer and be subject to any tests outlined in the CSA standards.

Manufacturer	Make/Model	Size Range	Comments/Conditions
Ipex	"Ring-Tite" PVC	200 to 1200mm	Must meet CSA B182.2
Rehau	"BondLoc" PVC	200 to 1200mm	and DR 35, Gasket joint
Royal	"Flex-Lox" PVC	200 to 1200mm	
Ipex	"Ring-Tite" PVC	100 to 150mm	Must meet CSA B182.2
Rehau	"BondLoc" PVC	100 to 150mm	and DR 28, Gasket joint
Royal	"Flex-Lox" PVC	100 to 150mm	
Pressure Sewer Main			
Ipex	"Blue Brute" PVC	100 to 300mm	Must meet CSA B137.3,
Rehau	"AquaLoc" PVC	(all makes)	C900, DR 18, Gasket joint
Royal	"FlexLox" PVC	350 to 900mm	Must meet CSA B137.3, C905, Gasket joint, DR 41 or better as per engineers' design and approval

3. SEWER MAIN FITTINGS AND APPURTENANCES

General

All fittings shall be CSA or ASTM approved; compounds used for molding fittings shall come from a single compound manufacturer. Locations of all proposed fittings must be shown on the Construction drawings and approved by the city.

Inserted Service Connections

Manufacturer	Make/Model	Size Range	Comments/Conditions
Le-Ron Plastics	Inserta Tee's PVC Gasketed	All	Acceptable for tie-ins to existing mains and for mains 375mm and over

Wye

Manufacturer	Make/Model	Size Range	Comments/Conditions
Le-Ron Plastics	PVC Gasketed	All	45°
Ipex	PVC Gasketed	All	45°
Royal	PVC Gasketed	All	45°

Couplings

Manufacturer	Make/Model	Size Range	Comments/Conditions
Ipex	PVC Gasketed	100 to 675mm	
LeRon Plastics	PVC Gasketed	100 to 675mm	
Mission Rubber	Shielded Transitional PVC	100 to 675mm	

Note: Must not be plasticized. PVC Shear band and clamps to be 316 series stainless steel. Clamps must be nut & bolt design. Bushings to be integral.

Royal	PVC Gasketed	100 to 675mm	

Caps

Manufacturer	Make/Model	Size Range	Comments/Conditions
LeRon Plastics	PVC Gasketed	100mm to 1200mm	
Ipex	PVC Gasketed	100mm to 1200mm	

3. SEWER MAIN FITTINGS AND APPURTENANCES CON'T

Gaskets

Manufacturer	Make/Model	Size Range	Comments/Conditions
Ipex	"Ring-Tite" PVC	200 to 1200mm	
Rehau	"BondLoc" PVC	200 to 1200mm	
Royal	"Flex-Lox" PVC	200 to 1200mm	

Service Connection Bends

Manufacturer	Make/Model	Size Range	Comments/Conditions
Le-Ron Plastics	PVC Gasketed	All	Refer to Note
Ipex	PVC Gasketed	All	Refer to Note
Royal	PVC Gasketed	All	Refer to Note

Note: all 22.5, 11.25, 45 Degree bends must be long radius.

Inspections Chambers

Manufacturer	Make/Model	Size Range	Comments/Conditions
Le-Ron Plastics	PVC Gasketed	100mm to 200mm	Single service IC's only

Inspections Lids

Manufacturer	Make/Model	Size Range	Comments/Conditions
Le-Ron Plastics	PVC	200mm	Must be locking and Red In colour

Brooks Boxes

Inspections Lids shall state "sewer".

Manufacturer	Make/Model	Size Range	Comments/Conditions
Langley Concrete	WM-37-1	590x410mm	Brook style Box
Kon Kast	No. 1480	545x370mm	Brook style Box

4. MANHOLES

General

All Concrete used in construction shall be sulphate resistant cement Type HS (Type 50) or alternate cement type may be approved by the City. All manhole components including any cast iron, steel or ductile iron shall be coated with an asphalt varnish. All material referenced in this section shall be constructed in accordance to the dimensions and material specifications referenced in Schedule 5 of Bylaw 7600 City of Kelowna Construction Standards, Section 2 standard drawings.

Manhole Cover

All Manhole covers shall conform to the standard detail drawing, all dimensions and specifications must meet the requirements as specified.

Manufacturer	Make/Model	Size Range	Comments/Conditions
TC/ACS	C44A	660mm Diameter	
Westview	TR40	660mm Diameter	
AE Concrete	C23	760mm Diameter	
Langley Concrete	C18	565mm Diameter	

Manhole Frame

All Manhole frames shall conform to the standard detail drawings, all dimensions and specifications must meet the requirements as specified. The required frame shall be specified by the Engineer.

Standard

Manufacturer	Make/Model	Size Range	Comments/Conditions
TC/ACS	C44A	760mm Diameter	
Westview	TR40	760mm Diameter	
AE Concrete	C23	760mm Diameter	
Langley Concrete	C18	565mm Diameter	

Adjustable

Manufacturer	Make/Model	Size Range	Comments/Conditions
TC/ACS	C44A	760mm Diameter	
AE Concrete	C23A	760mm Diameter	

Manhole Collars (Grade Rings)

Manufacturer	Make/Model	Size Range	Comments/Conditions
Kon Kast	720-723	50mm-150mm	760mm Diameter Opening
Langley Concrete	MH-6	50mm-100mm	760mm Diameter Opening

AE Concrete	915	50mm-150mm

Manhole Barrel Sections

Manufacturer	Make/Model	Size Range	Comments/Conditions
Kon Kast	Concrete	1050-2400mm	Refer to detail drawings
Langley Concrete	Concrete	1050-1500mm	

Manhole Steps

Manhole steps shall be fabricated from aluminum and installed as per the City of Kelowna Supplementary Specifications.

Manhole Barrel Lids

Manufacturer	Make/Model	Size Range	Comments/Conditions
Kon Kast	Concrete	1050mm-2400mm	Refer to detail drawings
Langley Concrete		635mm Opening	

Manhole Precast Bases

Manufacturer	Make/Model	Size Range	Comments/Conditions
Kon Kast	Concrete	1050mm-2400mm	Refer to detail drawings
Langley Concrete		1050mm-1500mm	

Interal Drops

Material supplied or recommended by the manufacturer and approved by the Engineer shall be used.

Manufacturer	Make/Model	Size Range	Comments/Conditions
Le-Ron Plastics		100mm-200mm	

REASON FOR POLICY

To standardize products used for City infrastructure.

LEGISLATIVE AUTHORITY

Local Government Act, Sec. 938 "subdivision servicing requirements"; Subdivision, Development & Servicing Bylaw, Schedule 5, Sec. SO2666, 2.1.2; MMCD Volume III

PROCEDURE FOR IMPLEMENTATION

Policy and products referred to in contracts and engineering drawings.

City of Kelowna
1435 Water Street
Kelowna, BC V1Y 1J4
250 469-8500
kelowna.ca

Council Policy

Hydrant Use Permit Policy

APPROVED April 11, 2005

RESOLUTION: R538/10/06/14
REPLACING: R375/10/04/26; R326/05/04/11
DATE OF LAST REVIEW: June 2010

THAT the Municipal Council of the City of Kelowna authorize the issuing of Hydrant Use Permits as per the terms and conditions of this policy.

A. PURPOSE OF POLICY

To provide a permit procedure in which the use of fire hydrants for uses over and above fire protection is regulated and in compliance with the City of Kelowna Water Regulation Bylaw.

B. DEFINITIONS

"Backflow" is the flow of water or other substances back into the potable water

"Backflow preventer" is a device designed to prevent the flow of water or other substances back into the potable water system. Approved backflow preventers include:

DOUBLE CHECK VALVE ASSEMBLY (DCVA)

REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA)

"Slide Gate Fire Hydrant" is a type of hydrant in which the seat ring is in the vertical position.

"Compression Fire hydrant" is a type of hydrant in which the seat ring is in the horizontal position.

C. ALLOWABLE HYDRANTS

Hydrant Use Permits will not be issued for any Slide Gate Fire Hydrant.

Hydrant Use Permits will not be issued for any hydrants serviced via a Pressure Reducing Valve, at the discretion of the Water Utility.

D. ALLOWABLE USES

The following hydrant uses are permissible through the Hydrant Use Permit procedure.

Direct connection to hydrant/backflow preventer

Construction road compaction

Construction dust control

Construction water main testing

Utility line flushing

Wellpoint dewatering installation

Road sweeping

Tanker truck filling

E. PROCEDURE

All Hydrant Use Permits applications shall follow the following procedure:

ALL BACKFLOW PREVENTION DEVICES ARE TO BE SUPPLIED AND INSTALLED BY CITY FORCES. NO PERSONS OTHER THAN CITY FORCES ARE TO OPERATE CITY OF KELOWNA FIRE HYDRANTS.

All Hydrant Use Permit applications shall be made a minimum of 48 hours in advance of when the hydrant is needed.

Application requests will be made at the Licensing and Bylaw Department of City Hall or at City Yards. Licensing staff shall ensure the request is for an approved use, the hydrant requested is an approved hydrant, and shall collect fees as per this Policy.

Through the electronic application process, a copy of the Hydrant Use Permit application shall be forwarded to the City Yard and the Fire Hall.

The Permittee will be contacted to make arrangements for the type of backflow device required, and confirmation of when the hydrant is required.

City staff will install and remove all required backflow devices as required.

The City of Kelowna Water Utility, and the Kelowna Fire Department, reserves the right to refuse or revoke any Hydrant Use Permit at any time, as they deem necessary.

F. FEES

The cost for a Hydrant Use permit shall be $25 per day, plus applicable taxes. This fee shall cover the costs of providing backflow preventers, the installation and removal of backflow preventers, the servicing of a hydrant after its use, and associated administrative costs.

G. ADMINISTRATION

Administration of the Hydrant Use Permit Policy shall be done by the City of Kelowna Utility Services Branch.

REASON FOR POLICY

To improve security of the City of Kelowna's water system infrastructure, by ensuring only qualified users operate our systems components, and backflow prevention is properly installed.

LEGISLATIVE AUTHORITY

Council Resolution.

PROCEDURE FOR IMPLEMENTATION

Civic Operations or City Yards.

Time to Implement: City of Kelowna

Landscape & Irrigation Standards for Water Conservation

City of Kelowna

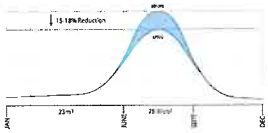
HB LANARC

Purpose

Reduce water consumption by 15% by 2012 on a community wide basis, over and above past gains;

- About 75% of the City's water consumption in summer months is in the form of outdoor landscape irrigation

City of Kelowna



HB LANARC

The Process

Kelowna's Water Sustainability Action Plan:

- Meetings with landscape and irrigation industry took place in 2007thru to date
- Landscape & Irrigation Guide to Water Efficiency brochure produced by the City of Kelowna
- Anticipation of a permitting process for new irrigation installations would be created to be phased in starting 2011

HB LANARC

City of Kelowna

Applicants are encouraged to complete the Sustainability Checklist

Education

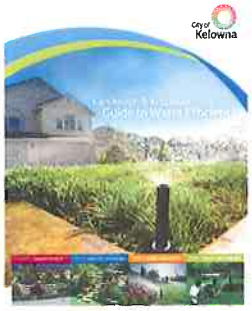
Landscape & Irrigation Guide to Water Efficiency

Four Steps to Water Conservation:

- Smart Design
- Smart Soil & Plantings
- Smart Irrigation
- Smart Maintenance

HB LANARC

City of Kelowna



Education

Web Site and Video Outreach

Covers several topics:

- Why Conserve
- Examples of Success
- Calculate Your Savings
- Incentives
- Approval Services
- Design Guidelines
- Details and Spec Examples

Includes 6 training videos and a water savings calculator

HB LANARC

City of Kelowna

Video

HB LANARC

City of Kelowna

Education alone is not meeting water conservation targets.

Although education and incentives are ongoing, there is a need to add a regulatory component – even for education purposes - that ensures compliance with the 'basics' of good landscape and irrigation practice.

Water Pricing (rates) also influences watering behaviour. An updated 5 year plan for gradual rate increases will be brought forward this spring. It will be designed to reward low water users and penalize wasteful water

HB LANARC

City of Kelowna

Education, Incentives or Regulation?

UDI Input

- prefer greater reliance on price incentives FIRST to disincentive waste – penalize inefficiency. Set rates by landscape area. (or seasonally adjusted rate).
- include retrofit programs in balance with new construction – new homes need to compete with existing home resale on a cost basis.
- prefer to have industry meet customer demand – what is the payback in water rates of better practices?

HB LANARC

City of Kelowna

- encourage 'do-it-yourselfer's to get expertise to do proper landscape/irrigation design/install.
- target incentives to both new controllers and retrofit – discounts to fees?
- recognize compliance with signs, etc.
- provide info/support to landscape/irrigation trades to educate consumers.
- tie in with other regulations to minimize steps.

Water Conservation Permitting Structure

Single Family and All Land Uses (but not agriculture):

- The City will integrate irrigation performance standards including a budget for maximum landscape water use into the existing Water Regulation Bylaws

Subdivision and City projects:

- Landscape and Irrigation standards and specifications will be integrated into Engineering Standards of Bylaw 7900

Multi-family, Industrial and Commercial Land Uses:

- Landscape and Irrigation Water conservation design guidelines are likely to be integrated with a streamlined overall development permit process

- Council approved approach in September 2010 and asked for bylaws to be prepared for consideration.

Requirements

Performance Based

- General guidelines for design
- Allows applicant to determine methods
- Flexible to innovation in technology
- Economic in allowing the least cost solution that meets objectives

HB LANARC

City of Kelowna

Performance Measurements:

Landscape Water Budget

sets upper limits for

Estimated Landscape Water Use

Schedule C *to the proposed Water Regulation Bylaw*

Landscape Water Conservation Report (3 parts)

- **Project and Applicant Identification**
- **Landscape Water Conservation Checklist**
  - **Smart Controller and Main Isolation Valve compulsory.**
  - **Other items expected to be checked and implemented – if all items checked an expedited permit is the goal.**
  - **Notes space is provided to explain if some checklist items don't apply to the given project – incomplete checklist or notes will be referred to Water Smart staff.**
- **Landscape Water Conservation Calculation Table**
  - **Spreadsheet Method**
  - **Manual Method**
  - **Landscape Water Budget must exceed Estimated Landscape Water Use**

Simple Spreadsheet Inputs

Landscape Type	Area (sq.m.)	Calculated Estimated Water Use (cu.m./yr)
Unwatered pervious	82	0
High water use lawn	275	393
High water use plants	55	55
Mod water use plants	138	99
Low water use plants	0	0

Calculated Results	
Annual Water Budget	550
Estimated Total Water Use	547
Estimate is less than Water Budget, therefore OK	

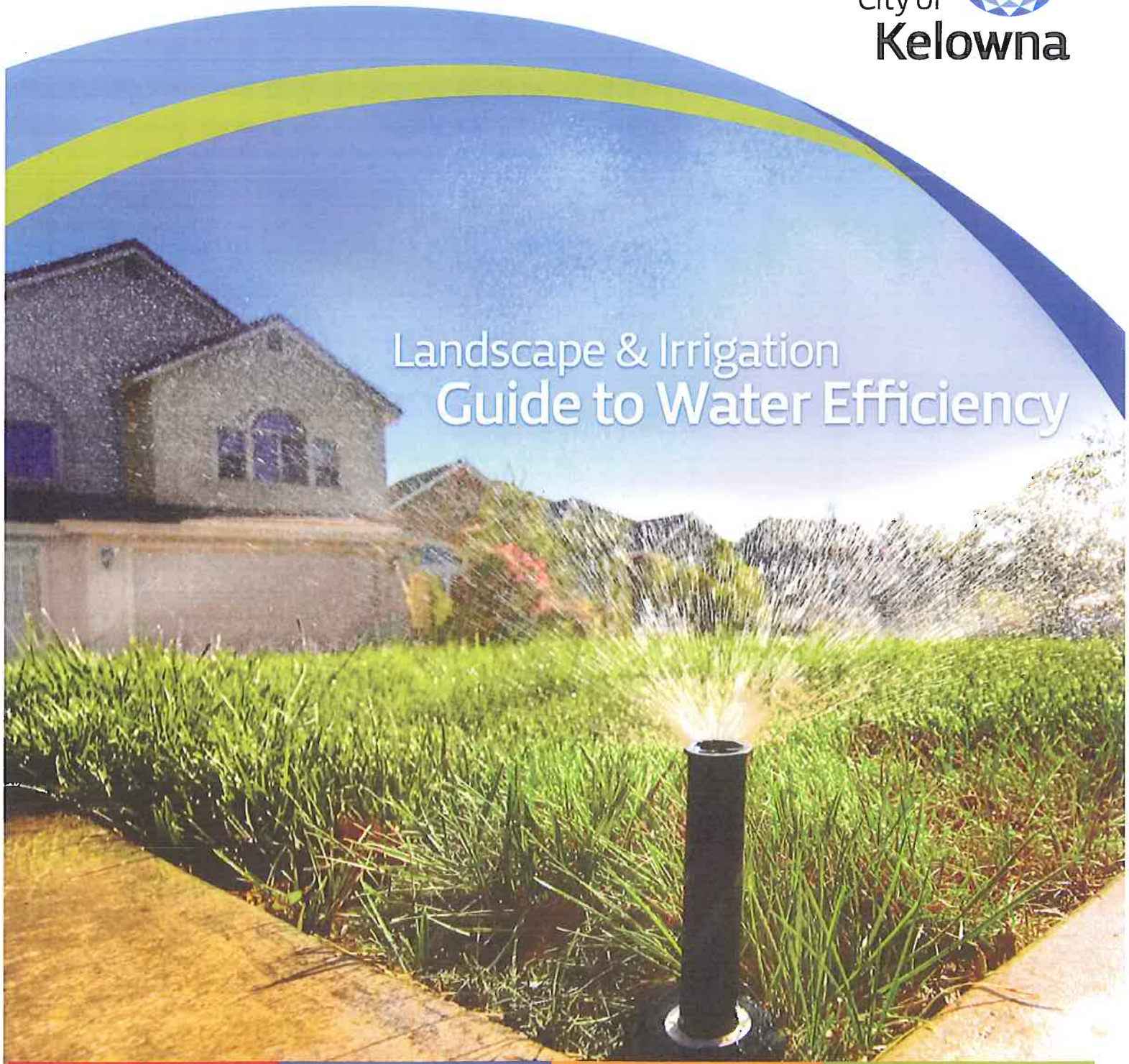
Summary

By using a Water Smart irrigation controller, and following guidelines for including non-watered pervious areas, low water use plants and limited lawn with current good irrigation practices, developments will easily live within the Water Budget

- New developments that waste water may face water use audits, irrigation shutoff and penalties under the Water Use Regulation
- Regulations, enhanced Education, and Water Pricing incentive programs are intended to be in place for the 2011 irrigation season. Additional incentives will follow.

City of Kelowna

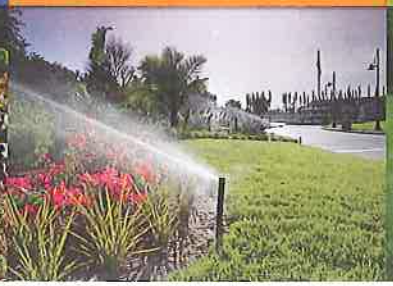
Landscape & Irrigation Guide to Water Efficiency



STEP 1: **SMART DESIGN**

STEP 2: **SMART SOIL & PLANTINGS**

STEP 3: **SMART IRRIGATION**



STEP 4: **SMART MAINTENANCE**

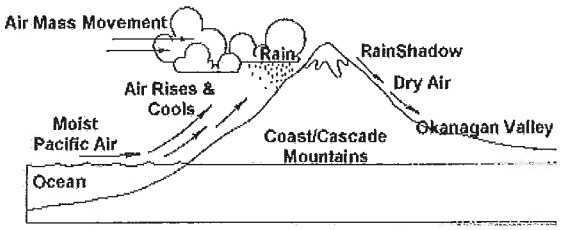
Landscape Water Use & the Environment

Why Reduce Landscape Water Use?

- Less than one per cent of the total water supply on earth is fresh water. Two thirds of it is groundwater and one third is surface water.
- Water use in Kelowna is, on average, more than four times greater in the summer months.
- Errors in design and operation of landscape installations often leads to inefficient water use.
- Residential water use far exceeds institutional, commercial and industrial use.
- Higher water consumption increases the demand for costly infrastructure. Water savings could allow the deferral of infrastructure investments.
- Using less water saves money.
- Better landscape techniques can reduce fertilizer and pesticide use and the need for maintenance.
- Reduced water use leaves more water in Okanagan Lake, aquifers and streams and supports the ecosystems that depend on it.

Our Natural Environment

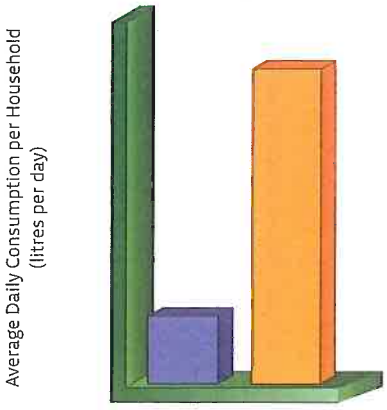
The Okanagan Valley lies in the rainshadow of the coastal mountains and receives minimal precipitation. Native plant communities in our region have evolved over thousands of years in response to the local climate, soils and terrain, and are well suited to very dry conditions. The best way to live within the means of Kelowna's local ecology is to mimic the low water demands of this native vegetation when designing, planting and maintaining a garden.



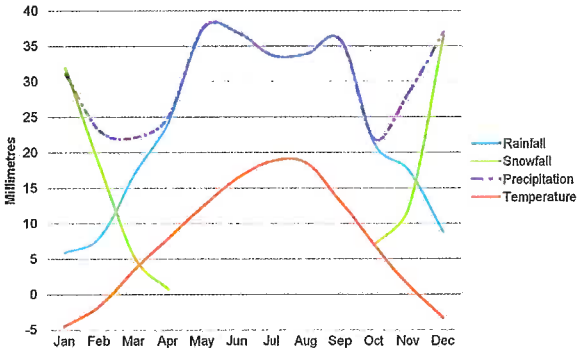
Climate Pattern & Irrigation Need

Kelowna's precipitation rates are low and consistent throughout the year. Much of the Okanagan Lake, stream and groundwater supply comes from spring snowmelt. Summer irrigation needs are driven mainly by higher temperatures.

Seasonal Water Use Per Household



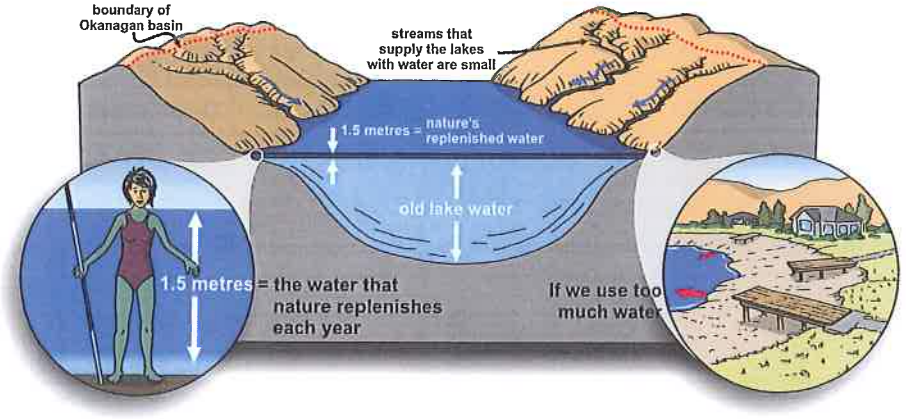
30 Year Average Climate Normals
(Environment Canada)



Winter water use in Kelowna is 639 litres per household, per day. In the summer, this more than quadruples to 2,852 litres per household, per day. Almost all of the increase is a result of outdoor landscape watering. It is estimated that as much as 50 per cent of outdoor water use is over and above that necessary to meet the objective of an attractive household yard.

Evaporation & Evapotranspiration

Although there may be a perception of water abundance because the vast Okanagan Lake is central to many views, the yearly resupply to our lake is minimal. It amounts only to the top 1.5 metres and much of this water evaporates during the hot summer months. Only 15 per cent of the total precipitation is available for human use. The rest of the water exits to the atmosphere through evaporation from the lake's surface and evapotranspiration from forests, grasses and crops. Any water that is used for agriculture or garden irrigation is quickly taken up by the plants and then by the surrounding air through transpiration. Minimal amounts of irrigation water infiltrates into the ground.



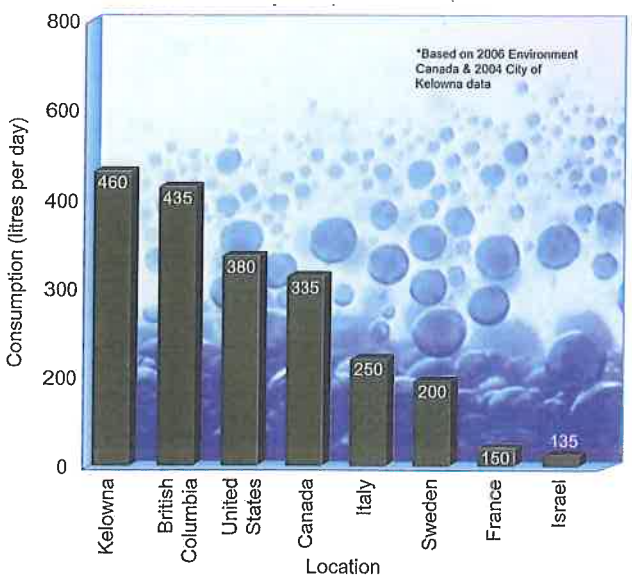
Aspect

Kelowna faces west and receives large amounts of sunlight from midday to early evening. Although preferable for picturesque sunsets and longer summer evenings, this western aspect increases evaporation and evapotranspiration losses.

Slopes & Soils

Kelowna has many uneven areas. Care must be taken when designing gardens and irrigation for sloped landscapes. A terraced design is preferred and irrigation zones with pressure regulation devices are needed to prevent downslope water losses. Soils in this region are well-drained and suited for agriculture and grazing. When designing gardens it's important to include a deep layer of absorbent soil with organic material that will help retain water for plants. Good soil texture with organic matter both in the soil and on the surface will provide erosion control.

Average Daily Domestic Water Use Per Person



The average daily water use per person in litres is 380 in the USA and only 135 in Israel. In Kelowna it is 460 litres per person, per day. Some European countries pay more than double for water what Canadians pay and use half as much.

Targets for Outdoor Water Conservation

In new developments, a 15 per cent to 30 per cent reduction in outdoor water use can easily be achieved by using the simple steps in this guide: Reaching this target is easy through a combination of good design, suitable soil and plants and appropriate irrigation and maintenance practices.

Image Credits:

- Derek Marcoux RPBio, Instructor, School of Renewable Resources, Selkirk College.
- 'Rainshadow' www.bcadventure.com/adventure/frontier/homestead/okan.htm
- 'ET' www.cimis.water.ca.gov/cimis/infoEtoOverviewPF.jsp

Landscape Design for Water Conservation

Step 1: Smart Design

The design of landscapes is the starting point to water conservation. Landscape design, whether generated by a landscape architect, contractor or homeowner, involves:

- Site Analysis: Identify existing vegetation that could remain. Determine where slopes or drainage conditions will influence the site use and design. Be aware of the sun/shade exposure of different areas. Dig holes and analyze the native soil. Determine if you need to import growing medium – a mix of weed-free soil, compost and other additives.
- Site Schematic Concept: Prepare a diagram of proposed uses for your yard, such as driveways, decks, play areas, utility areas, existing vegetation areas and proposed planted areas. Identify required walkway connections. Be aware of underground utilities and required grading or terracing.
- Hydrozone, Planting and Soil Concept: Group planting areas into 'hydrozones' as you develop your plan. A simple diagram of yard zones with different watering needs is the key to effective outdoor water conservation.

Hydrozones

Hydrozoning divides a landscape into areas based on water needs: high, medium or low. Highly ornamental areas may warrant high water use. Areas of native plants may need no watering at all. When starting a landscape design, produce a sketch of the planned hydrozones. Group plants according to their water requirements, and sun and wind exposure. Once hydrozoning has been planned, watering systems can be designed to match.

High Water Use Areas

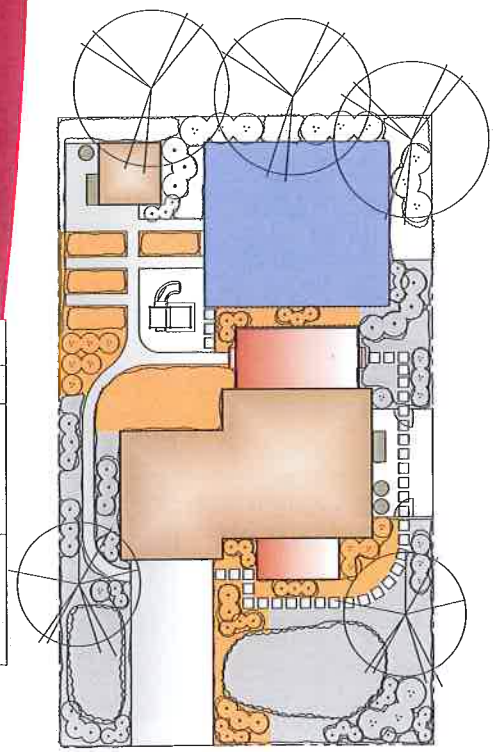
High water use areas include lawns and ornamental plants, perennials and annuals. These areas require more water and maintenance to keep them looking their best throughout the summer.

- Reserve highly visible areas for high-impact planting.
- Homeowners with children or pets may desire lawn to accommodate running and playing, but it is advisable to not over-plant lawn. Minimize manicured lawn areas and water use will fall dramatically.

Medium Water Use Areas

The plants in medium water use areas require less water in dry climates.

- Plants in these areas consist of shrubs or ground covers that require less water to keep them looking their best year round.
- This xeriscape landscaping can be attractive, both in the front yard and less visible areas.
- Only low water use irrigation is needed for these areas, such as low volume or drip.



HYDROZONE LEGEND	
SYMBOL	CATEGORY
	HIGH WATER USE ZONE
	MEDIUM WATER USE ZONE
	LOW WATER USE ZONE
	UNIRRIGATED

Low Water Use & Unirrigated Areas

These areas require little to no supplemental water once established. These include unplanted areas and places where native vegetation is established.

- Save areas of existing native vegetation.
- Preserve and protect natural features of the site like streams, natural drainage areas, riparian areas, landforms, rock outcroppings, hilltops, ridgelines and shorelines.
- Plant native vegetation or low-water need plants and water only for the first growing season until roots are established.
- Use permeable surfaces for driveways, walks, decks/patios and utility areas to allow natural seepage and filtration of surface water.
- Consider materials such as stone or organic mulch, pervious pavements or spaced wood deck, rather than plants requiring water.

Rather than large expanses of lawn, creative use of other hard and soft surfaces can create an appealing, Water Smart space.

Minimize turf areas

Lawn areas are the highest water user in the landscape and a manicured lawn requires far more time and effort to maintain than other forms of planting and ground cover. There are many alternatives to turf that can have an appealing appearance, reduced maintenance and require little or no watering. Consider the following lawn alternatives:

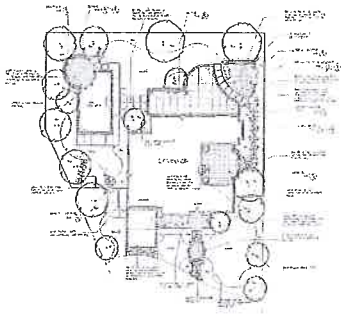
- ground cover planting
- meadowgrass / flowers
- cobble
- mulch
- crushed stone / gravel
- interlocking brick
- permeable unit paving
- decking

A sloping site will have different drainage capacity than a flat surface.

Slopes & Drainage conditions

The slope of the property will let a homeowner know where water will collect or run off. The tops of slopes are inherently drier than the bottom. Depending on the drainage of a site this may effect the landscape design and plant selection. Slopes also affect the exposure to the heat of the sun. Areas sloping to the north will be cooler and more shady than slopes facing south. Test the drainage of a site using the following steps:

- Dig a hole and fill it with water.
- If the water drains through immediately the soil is sandy.
- If the water remains in the hole overnight the soil is more clay based. Clay-based soils are more at risk of runoff if irrigation water is applied faster than it can soak in. Special irrigation heads that deliver water slowly are needed for clay soils.



By creating a landscape plan, you will be able to plan your garden use and water use at the same time.

Meeting a Water Conservation Target

To meet a target of 15 per cent to 30 per cent water use reduction compared to 'normal' outdoor practice, follow or combine these examples:

- Design 15 per cent to 30 per cent of the landscape area to not require watering (e.g. native landscape or non-plant mulch).
- Design to minimize turf areas – try less than 25 per cent of the landscape.
- Use large areas of low water use plants.
- Ensure growing medium depth and quality and provide mulch.
- Use high-efficiency irrigation and weather-based controllers.

These ideas are detailed in the following pages.

Image Credits:

- 'Greenhill Propagation Nusery' by Vivid Design www.melbflowershow.com.au/highlights_2005_garden.asp
- 'South Hill Garden' www.myenglishgardener.com/tours
- 'Site Plan' by Arborealis arborealis.com/ConstructionDrawings/L1-Site-Plan.gif

Soil & Plants for Water Conservation

Step 2: Smart Soil & Plantings

Group Plant by Growing Requirements

All plants have an ideal growing situation. Group plants together with similar soil, light and water requirements. This will result in more vigorous plant material that requires less maintenance and water.

Soil is the Secret

There is nothing more important to the success of a landscape than the soil. The combination of the mineral soil, soil organisms and organic matter– or 'growing medium' as the combination is called in the landscape trade – will determine almost entirely the performance of the lawn and plantings in terms of survival, health, rate of growth and water needs.

Good growing medium can double the rate of plant survival and growth, and cut the water need by 50 per cent. And yet growing medium is often one of the first things to be sacrificed to save money.

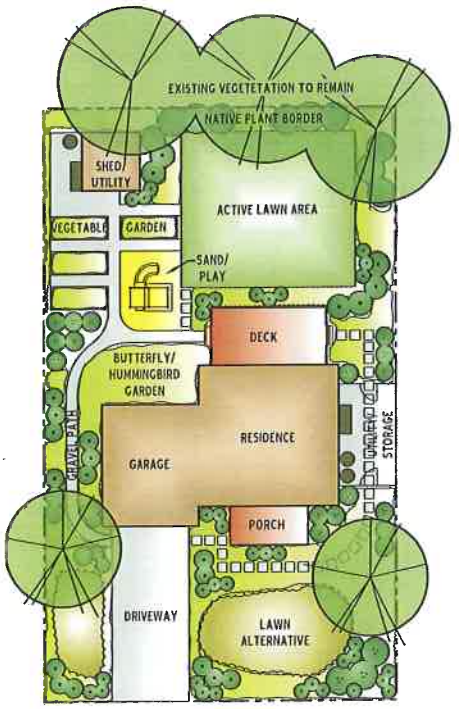
For more information, see the National Sustainable Agriculture Information Service of the National Center for Appropriate Technology website at:

www.attra.ncat.org/attra-pub/soilmgmt.html

Living Soil & Organic Matter

A Water Smart soil is a living soil. In a typical suburban lot, good quality living topsoil contains approximately 90 pounds of earthworms, 240 pounds of fungi, 150 pounds of bacteria, 13 pounds of protozoa and 89 pounds of arthropods and algae. This soil life and its foodweb cultivate and aerate the soil, improve its structure and increase the availability of water and nutrients for plants. If the organic matter in a growing medium is less than one per cent, all this life will die. Optimum amounts of organic matter in a living growing medium provide a garden soil that:

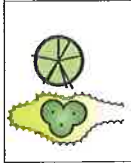
- feels soft and crumbles easily and has few clods and no hardpan
- drains well and warms up quickly in the spring and resists erosion and nutrient loss
- does not crust after planting and supports high populations of soil organisms
- soaks up heavy rains with little runoff and has a rich, earthy smell
- produces healthy, high-quality plants and does not require increasing fertilization
- stores moisture for drought periods



Topsoil & Organic Matter Quality

Growing medium is often a mix of topsoil and organic matter, and sometimes sand. Common problems to avoid when purchasing growing medium include:

- Topsoil that is too coarse (no silt or clay) or too heavy (no sand). A sandy loam is the optimum texture.
- Topsoil that is weed infested. Seeds can lay dormant in topsoil for years. Look for a topsoil source that is relatively weed free.
- Compost that is weed infested or compost that is not yet decomposed, which robs the soil of nitrogen. Livestock manure often has both these problems. Both weed seeds and decomposition problems can be avoided with a proper composting process.

LANDSCAPE LEGEND	
SYMBOL	CATEGORY
	TREE SHRUB/GROUND-COVER

Purchase growing medium from reliable suppliers and contractors who can certify that the products meet the specifications of the BC Landscape Standard and local bylaws.

Growing Medium Depth

Adequate soil depth plays an important role in storing and retaining water and nutrients for vigorous root growth. Provide a minimum of 150 mm (6") for lawn areas and 300mm to 450 mm (12"-18") for shrubs.

Plants

There are many plants available at nurseries that are drought tolerant. Native plants are accustomed to the local environment and often require less frequent watering. In some cases, these plant selections will not require any additional water once established.

Plant Selection Guide

The plants listed on the right, while not an exhaustive list of water conserving plants, offer a reliable starting point for homeowners.

Grass Species & Sod Mix

Where lawn is planned for functional purposes, there are varieties of grass that have been developed for drought resistance, high traffic and colour variations. In the summer, allowing the lawn to go dormant does not reduce the grass vigour. Summer dormancy mimics the grass natural cycle. Ask your contractor or grass supplier for seed or sod with low-water needs. Often these varieties will include a high per centage of tall fescue, sheep fescue, slender red fescue, creeping red fescue, and hard fescue. New drought-tolerant varieties of these and other species are increasingly available.

Mulching

Use of mulch can reduce water loss through evapotranspiration. It cools plant root zones, which reduces the amount of water plants lose through evaporation. Mulch reduces weed growth and helps control erosion. It also adds a finished look to a garden while adding nutrients to plants. Apply mulches at a minimum thickness of 5 - 7.5 cm (2 - 3"). Inspect depth seasonally and add as required to maintain minimum depth.

Annual Supplemental Water Requirements

0" - 3" (7.5cm)	4" - 7" (10 -18cm)	8" - 11" (20 - 28cm)
Trees		
▸ Gymnocladus dioica Kentucy Coffee Tree	▸ Acer ginnala Amur Maple	▸ Morus alba 'Fruitless' Fruitless White Mulberry
▸ Koelreuteria paniculata Golden-Rain Tree	▸ Crataegus crus-galli inermis Thornless Cockspur Hawthorn	▸ Nyssa sylvatica Sour Gum
▸ Pinus flexis 'Vanderwolfe' Vanderwolfe's Limber Pine	▸ Ginkgo biloba Ginkgo	▸ Picea pungens Colorado Spruce
▸ Pinus Ponderosa Ponderosa Pine*	▸ Gleditsia tracanthos var. inermis Thornless Honey Locust	▸ Populus tremuloides Quaking Aspen* (i)
▸ Prunus domestica Prune Plum	▸ Juniperus scopularum Rocky Mountain Juniper*	▸ Pyrus calleryana 'Chanticleer' Chanticleer Calleryana Pear
▸ Syringa reticulata 'Ivory Silk' Ivory Silk Lilac Tree	▸ Pinus nigra Austrian Pine	▸ Sophora Japonica Japanese Pagoda Tree
Shrubs & Hedges		
▸ Amelanchier alnifolia Saskatoon*	▸ Berberis thunbergii Japanese Barberry	▸ Buddleia davidii Butterfly Bush
▸ Ceanothus velutius Snowbrush*	▸ Caryopteris x clandonensis Bluebeard, Blue Spirea	▸ Cotoneaster ssp. Cotoneaster
▸ Chrysothamnus nauseosus Rabbitbrush*	▸ Pinus mugo mugo Dwarf Mugo Pine	▸ Euonymous alata 'Compacta' Dwarf Burning Bush
▸ Holodiscus discolor Ocean Spray*	▸ Potentilla fruiticosa Cinquefoil	▸ Physocarpos opulifolius Nine Bark
▸ Ligustrum vulgare European Privet	▸ Pyrecantha coccinea Scarlet Fire Thorn	▸ Picea pungens 'Glauca Globosa' Blue Globe Spruce
▸ Mahonia aquifolium Oregon Grape*	▸ Syringa ssp. Lilac	▸ Rosa rugosa Rugosa Rose
▸ Rhus ssp. Sumac (i)	▸ Viburnum lantana Wayfaring Tree	▸ Taxus x media Yew (hedging varieties)
Groundcover/Perennials		
▸ Artemesia ssp. Wormwood (i)	▸ Coreopsis Veticillata 'Golden Showers' Threadleaf Coreopsis	▸ Aster frikartii Frikart's Aster
▸ Achillea ssp. Yarrow	▸ Arctostapholus uva-ursi Kinnickinnick*	▸ Calamagrostis 'Karl Foerster' Karl Foerster Feather Reed Grass
▸ Festuca ovina glauca Blue Fescue Grass	▸ Gaillardia aristata Blanket Flower*	▸ Cotoneaster adpressus Creeping Cotoneaster
▸ Nepeta x faassenii Hybrid Catnip	▸ Helictotrchon sempervirens Blue Oat Grass	▸ Echinacea purpurea Purple Cone Flower
▸ Perovskia atricipifolia Russian Sage	▸ Juniperus horizontalis 'Wiltonii' Blue Rug Juniper	▸ Hemerocallis ssp. Daylilies
▸ Salvia officionalis var. Herbal Sage	▸ Lavender angustifolia var. English Lavender	▸ Miscanthus sinensis 'Gracillimus' Maiden Grass
▸ Santolina chamaecyparissus Lavender Cotton	▸ Oenothera missouriensis Missouri Evening Primrose	▸ Rosa rugosa 'Meidiland' var. Meidiland Rose
▸ Thymus ssp. Thyme	▸ Sedum ssp. Stonecrop	▸ Rudbeckia 'Goldsturm' Goldsturm Gloriosa Daisy
▸ Yucca glauca Soapweed	▸ Sempervivum ssp. Hens & Chicks	▸ Saccharum ravennae Hardy Pampas Grass

* native species (i) spreading/ suckering roots

Irrigation Guidelines for Water Conservation

Step 3: Smart Irrigation

Audits of installed irrigation systems have revealed major problems with design and installation quality. Without proper design and maintenance, an irrigation system will waste water. With proper design, an irrigation system can be a water conservation device.

Many problems are due to lack of experience when homeowners or under-qualified contractors work without supervision.

For these reasons, approval authorities are moving to require permits for irrigation installation. These permits are easy to get, and inexpensive. They are intended to help make sure that all irrigation installations meet basic industry standards and encourage the use of current best practices for water conservation.

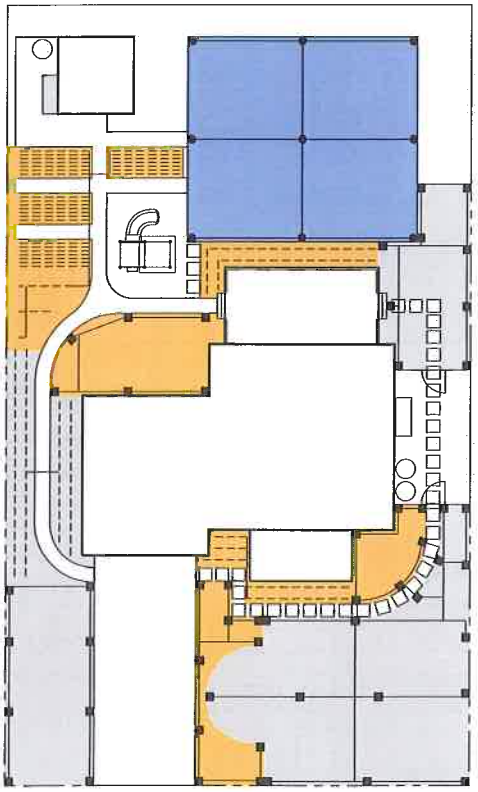
It is possible for a homeowner to design and install their own irrigation system, but the level of expertise involved, for design in particular, is usually better left to someone with professional training. Look for Certified Irrigation Designers under the Irrigation Industry Association of BC.

Hydrozones

Turf zones and shrub planting beds should never be irrigated on the same zone. Water requirements for turf exceed the requirements of most shrubs or groundcovers. If both share a zone, water is being wasted on plants that do not need it. In addition to saving water, designing by hydrozones will result in healthier, more vigorous plant material. Although it will require more zones initially, a hydrozone approach will save water in the long run.

Head-to-Head Coverage

For even, efficient watering, each sprinkler's spray should reach the next sprinkler head. Under-spray results in dry spots or overwatering in attempt to keep the driest areas green, while over-spray wastes water.



IRRIGATION LEGEND	
SYMBOL	CATEGORY
●	ROTOR
■	MPR SPRAY
- - - - - -	LOW VOLUME/DRIP

Precipitation Rates

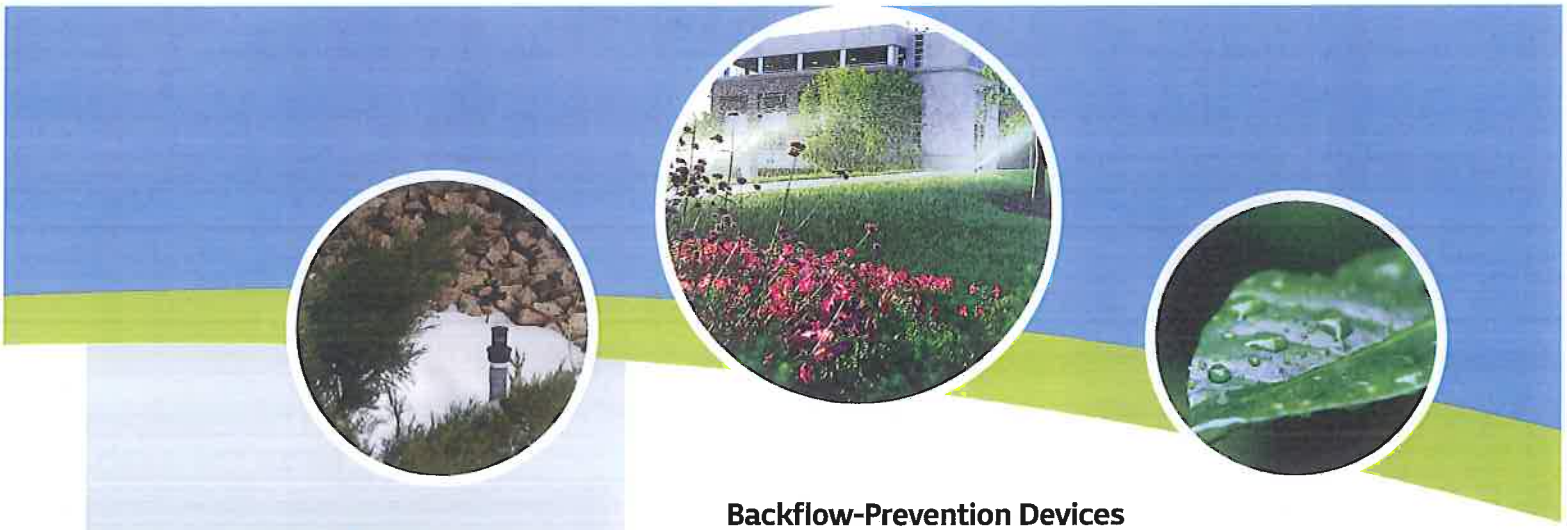
Irrigation manufacturers offer spray heads with matched precipitation rates, providing the flexibility of mixing and matching throw and radius. Rotors, spray and drip should never share a zone as timeclock settings vary between these forms of water application. Use nozzles that apply water evenly to save up to 30 per cent in water usage. Use drip or low-volume nozzles wherever possible to reduce water flow rates.

Site Contours

Avoiding extreme elevation changes in a zone ensures even pressure and watering. It prevents water flowing down to the lowest head and draining out, causing puddling, erosion and wasted water. If elevation changes in a zone cannot be avoided, 'check' valves should be installed to trap the water in the lateral line to prevent water from draining out the lowest head.

Over-Spray

Irrigation should not over-spray onto adjacent structures, paving and properties. Careful head installation and nozzle orientation will ensure that water is spraying where it is intended.



Watts 007 Double Check Valve Assembly

RSD Rain Sensor

Rainbird PGA-PRS-D Valve

Watts N45B-EZ Pressure Regulator

Hunter ICC Controller

Rainbird ET Manager

Backflow-Prevention Devices

Every system should have backflow prevention to help ensure there is no contamination into the municipal water system by fertilizers or pesticides used within the yard.

Pressure-Regulating Devices

Excess pressure through spray heads and rotors results in misting and fogging. These fine droplets are easily blown away by even the lightest winds, resulting in inadequate coverage and loss of water. This inefficient watering leads to increasing the run time for the zone, which only increases the loss of water. There are a number of pressure regulating devices on the market, including: pressure-regulating valves installed at the backflow preventer, pressure-regulating spray heads, pressure-reducing valves and pressure-regulating modules installed on valves. Every 5 psi reduction in water pressure reduces water use by 6–8 per cent.

Automatic Shut-Off Devices

Adding an automatic shut-off device can result in 15-20 per cent in water savings. Devices like rain and moisture sensors automatically shut off controllers when it is raining or when sufficient soil moisture has been reached.

Automatic Controllers with Water-Conserving Functions

The objective of efficient irrigation is to provide only enough water to keep the plant healthy. Years of research and technology development have resulted in controllers that can be programmed to ensure the best use of water. Water-efficient features include:

- Water Budget Features - Allows the user to change the applied water through the season by changing the watering time by a per centage. For example, setting a watering program for the driest condition (July) would overwater in spring and fall. Programming the controller for varying seasons ensures efficient water use year round.
- 365 Day Clock - Allow settings to vary by day, week or month.
- Multiple Start Times Per Day - Water must not be applied more rapidly than the soil can absorb it. By programming for multiple start times, saturation and runoff is avoided by allowing the water to soak in between watering times.
- Weather or ET (evapotranspiration) Based Programming - These timeclocks use weather data to adjust their settings automatically to meet the needs of the plants.

Watering during early morning or evening reduces the loss of water to evaporation. Plants are best watered in the morning to avoid disease caused by water sitting on plant leaves overnight.

Maintenance for Water Conservation

Step 4: Smart Maintenance

A large portion of unnecessary water use is related to improper settings for the irrigation timeclock. Turfgrass generally requires 25 mm (1") of water per week during the driest part of the year. Natural rainfall should be included as a part of this allowance. The water requirement in spring and fall months is much less than is required in July.

New weather-based irrigation timeclocks are available that automatically adjust time settings to correspond to historic or current real weather conditions. Installing weather based controllers provides long-term savings.

If using a non weather-based controller, set the watering time for each irrigation circuit for the driest month (July), and then adjust the time each month using the Water Budget feature or manual adjustments.

Irrigation leaks are another water waster. Ensure your system passes 'hydrostatic pressure tests' when it is installed or if it is affected by digging. To manually check for leaky irrigation lines, turn off all indoor water appliances and monitor your meter to see if it is still running – this could indicate an irrigation leak.

Irrigation Timeclock Settings for the City of Kelowna

	Apr	May	June	July	Aug	Sept	Other
Rotors - Lawn (precipitation rate assumed at 0.47 in/hr, actual will vary)*							
Watering (minutes/week)	73	92	119	132	112	73	Off
Water Budget (%)	55%	70%	90%	100%	85%	55%	
Sprays - Lawn (precipitation rate assumed at 1.75 in/hr, actual will vary)*							
Watering (minutes/week)	22	27	36	36	27	22	Off
Water Budget (%)	60%	75%	100%	100%	75%	60%	
Low Volume Sprays - Lawn (precipitation rate assumed at 0.43 in/hr, actual will vary)*							
Watering (minutes/week)	79	108	130	144	122	79	Off
Water Budget (%)	55%	75%	90%	100%	85%	55%	
Dripline - Shrubs (p rate assumed at 0.58 in/hr based on 0.9GPH, 18"x18" spacing; actual will vary)*							
Watering (minutes/week)	35	63	98	105	91	35	Off
Water Budget (%)	33%	60%	93%	100%	86%	33%	
Sprays - Shrubs (precipitation rate assumed at 1.75 in/hr, actual will vary)*							
Watering (minutes/week)	18	27	32	36	32	18	Off
Water Budget (%)	50%	75%	90%	100%	90%	50%	
Low Volume Sprays - Shrubs (precipitation rate assumed at 0.43 in/hr, actual will vary)*							
Watering (minutes/week)	74	95	122	135	122	74	Off
Water Budget (%)	55%	70%	90%	100%	90%	55%	

Irrigation Winterization

In freezing climates, irrigation systems are 'blown out' each year so expansion of freezing water in the pipes or heads does not damage the system. Ensure that an experienced contractor provides winterization and they guarantee that they will not damage the system. Be wary of blow-out pressures that are higher than the system design pressure (usually 30 – 50 psi) that can burst pipes or damage heads.

Spring Checklist for Irrigation Start-up

- Wait until threat of frost has passed and dry weather has begun.
- Moisture in good quality soil will carry most plants well into the spring without supplemental irrigation. If your lawn is browning during early spring, check that your soil depth and quality is adequate and supplement with organics, if necessary.
- Check that your backflow-prevention device is working. Test it if required.
- Shut off all other water use in the house prior to opening the irrigation master valve. Slowly open the valve and let the main irrigation line pressurize. Watch your water meter to see if it stops running once the mainline is full. If it does not, have a contractor check the mainline for leaks.
- Check and clean or replace your filters, particularly on drip systems.
- Test run each irrigation circuit. Adjust head rotation to avoid overspray. Replace broken heads.
- Check and readjust your timeclock – at startup and at least once per month to adjust for the varied water requirements over the season.

Irrigation Trouble-Shooting Tips

Local Dry Spots or Local Wet Spots:

- Consider the local terrain, soils, tree cover and sun exposure. Differences may lead to different watering needs.
- Check for head-to-head spacing and matched precipitation rates of nozzles. Adjust head spacing or nozzles if necessary. One way to do this is to replace heads with matched precipitation rate, variable-radius nozzles like the MPR Rotator. Adjust the radius as required.

Water Bill Too High:

- Have your irrigation system checked for leaks.
- Reduce your timeclock settings using the Typical Timeclock Settings described earlier in the brochure. If your yard survives at the new setting, drop the water budget a further 10 per cent and watch for plant response. Keep lowering the settings until some plant stress shows, and then raise them slightly.
- If local dry spots appear, follow the tips above.
- Check the depth and quality of your soil. If there is less than 150 mm (6") for lawn and 300 mm (12") for shrubs/ veggies, try adding compost or a compost soil mix to increase water retention and root growth.
- Reduce the area of lawn or the area watered. Increase areas of your site that are low to no-use hydrozones.
- Replace circuits of your irrigation system with low volume or drip components.

Topdressing & Mulching

Dig a test hole in typical areas of your yard. If the depth of good black crumbly soil is less than 150 mm (6") under lawn and 300 mm to 450 mm (12" – 18") for shrubs, you are likely using more water than you should. Rather than starting over with new plantings, it is possible to gradually add to your soil depth by topdressing with thin layers of growing medium and wellcomposted organic matter.

For grass areas:

- Topdressing should not exceed 6mm (1/4") depth at a time.
- Once grass is established, stop removing the grass clippings from the surface. Mow regularly, and allow the clippings to decay into the soil, where they will recycle the organic matter and nutrients back into the soil organisms and the grass.

For shrub and groundcover areas:

- The maximum depth per topdress application or growing medium / organic matter could be as much as 75 mm (3").
- For on-going maintenance once adequate soil depth is in place, use organic mulches, like bark mulch, to reduce soil evaporation, minimize weed germination and to provide a long-term supply of organic matter.
- Allow leaf drop to remain as this builds up a 'natural duff' like in the forest, that builds the soil, soil life, and recycles nutrients.

Compost Tea & Fertility

Growing medium with organic matter that meets the BC Landscape Standard will require less water, less fertilizer and will grow plants almost twice as fast as those in poor soils. The resulting plants will also be much healthier, with fewer weeds and little need for pesticides.

Supplemental fertilization, when necessary, should be done sparingly and always with slow-release fertilizers. Never use a fertilizer with added herbicide – fertilize and let the grass outcompete the weeds, hand pull if there are only a few weeds and use a spray herbicide only as a last resort. For more information about the City of Kelowna's pesticide bylaw and managing weeds and other pests naturally, visit the Pesticide pages at kelowna.ca/environment.

As an effective alternate to chemical fertilizers, ask your garden centre or landscaper about 'compost tea'. This liquid extract from active compost is extremely effective at increasing nutrients in soils and plants – it's also a natural de-thatcher on lawns.

Web Links

City of Kelowna Water Smart Program
kelowna.ca/watersmart

Waterbucket
www.waterbucket.ca

CRD Water Services
www.crd.bc.ca/water

Saving Water Partership - Seattle and Participating Water Utilities
www.savingwater.org/docs/PlantList.pdf

Native Plant Society of British Columbia
www.npsbc.org

Durham Region - Ontario
www.region.durham.on.ca/waterefficiency

Oregon State University Plant Database
oregonstate.edu/dept/ldplants

Irrigation Industry Association of British Columbia
www.irrigationbc.com

Okanagan Xeriscape Association
www.okanaganxeriscape.org

Colorado Water Wise Council:
www.xeriscape.org

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To find qualified help for landscape or irrigation design and construction supervision, look for the appropriate membership and training from the organizations below:

Irrigation Industry Association of BC (IIABC)
'Certified Irrigation Designer' from the IIABC is a key qualification for irrigation design. They and 'Certified Irrigation Technician II' are qualified to supervise irrigation construction.

IIABC Office
2330 Woodstock Drive
Abbotsford, BC V3G 2E5
TEL 604 859-8222
www.irrigationbc.com

BC Landscape and Nursery Association (BCLNA)
'Certified Horticultural Technicians' are qualified to supervise landscape construction, and often offer landscape design-build services for single family homes.

BCLNA Office
Suite #102, 5783 - 176A Street
Surrey, BC V3S 6S6
TEL 800 421-7963
www.bclna.com

BC Society of Landscape Architects (BCSLA)
'Landscape Architects' are qualified in design and construction supervision of all landscape installations, but should also have qualifications as an IIABC Certified Irrigation Designer if their scope is irrigation design/supervision.

BCSLA Office
Suite #110, 355 Burrard Street
Vancouver, BC V6C 2G8
TEL 604 682-5610
www.bcsla.org

City of Kelowna

Water Smart
1435 Water Street
Kelowna, BC V1Y 1J4
TEL 250 868-3339
neal@getwatersmart.com

kelowna.ca