TORO®

Guide for Achieving LEED Credits with Toro® Irrigation Products

What is LEED®?

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria. This rating system is developed and maintained by the U.S. Green Building Council (http://www.usgbc.org).

LEED is the nationally accepted benchmark for the design, construction and operation of high performance green buildings. LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

LEED Rating System

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ is the nationally accepted benchmark for the design, construction and operation of high-performance green buildings. LEED provides building owners and operators with the tools they need to have an immediate and measurable impact on their buildings' performance.

The USGBC's new (2009) LEED point rating-system is as follows:

- Platinum (80 points and above)
- Gold (60-79 points)
- Silver (50-59 points)
- Certified (40-49 points)

These points are awarded in the following categories:

Category	Possible Points
Sustainable Sites	26
Water Efficiency	10
Energy and Atmosphere	35
Materials and Resources	14
Indoor Environmental Quality	15
Innovation in Design	6
Regional Priority	4
Total Possible Points	**110**

LEED & Irrigation

There are various project categories (New Construction, Schools, Retail, and Existing Buildings) in which Toro® irrigation products can be used to increase the points for a project working towards obtaining LEED certification. Visit USGBC website, www.usgbc.org, to download templates that simplify the process of registering a LEED project and submitting documentation toward certification.

Points earned by making efficient irrigation related decisions (alternative water-sources; irrigation product selection).	Up to 4 points
WE Credit 1.1 (Water Efficient Landscaping; Reduce by 50%)	2 points
WE Credit 1.2 (Water Efficient Landscaping; No Potable Water Use or No Irrigation)	4 points (includes meeting the requirements for WE Credit 1.1)
Points for irrigation strategies	**6 points or more**
Innovation & Design Credit 1: Innovation in Design	1 point
Sustainable Credits 5.1: Site Development: Protect or Restore Habitat	1 point
Sustainable Sites Credit 6.1: Stormwater Design: Quantity Control	1 point
Sustainable Sites Credit 7.2: Heat Island Effect	1 point
Energy and Atmosphere Credit 1: Optimize Energy Performance	Up to 10 points
Regional Points Credit 2: Regional Priority Credit	1-4 points
Materials and Resources Credit 4: Recycled Content	1-2 points

Water Efficiency Credit 1.1: Water Efficient Landscaping: Reduce by 50% (2 Points)

Intent

Limit or eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation. Use high efficiency irrigation technology, OR, use captured rain or recycled site water to reduce potable water consumption for irrigation by 50% over conventional means.

Requirements

Reduce potable water consumption for irrigation by 50% from a calculated mid-summer baseline case. Reductions shall be attributed to any combination of the following items:

- Plant species factor
- Irrigation efficiency
- Use of captured rainwater
- Use of recycled wastewater
- Use of water treated and conveyed by a public agency specifically for non-potable uses

How to Calculate Savings for Credit

1. Calculate a baseline water use for an "average site" in your area the same size as your design in the month of highest average Evapo-Transpiration (ET) – Typically July.
2. Calculate the expected water use of your design in July, utilizing a reference evapotranspiration (ET), landscape coefficients for your plant selections, and irrigation efficiency of your design.
3. Add in water savings (hottest month usage) based upon estimated volume of public agency conveyed non-potable water or water supplied by a greywater or storm water reuse system if they are part of your design.
4. Determine Water Savings (%) based upon plant selections, irrigation efficiencies, and water reuse.
5. Add additional savings (beyond efficiency savings) earned through irrigation product selection (e.g. use of a Toro® Wireless Rain/Freeze Sensor with Water Conservation Modes can provide additional 15% savings)
6. Total savings must be equal to or greater than 50% of your baseline water use for an "average site."

Water Efficiency Notes:

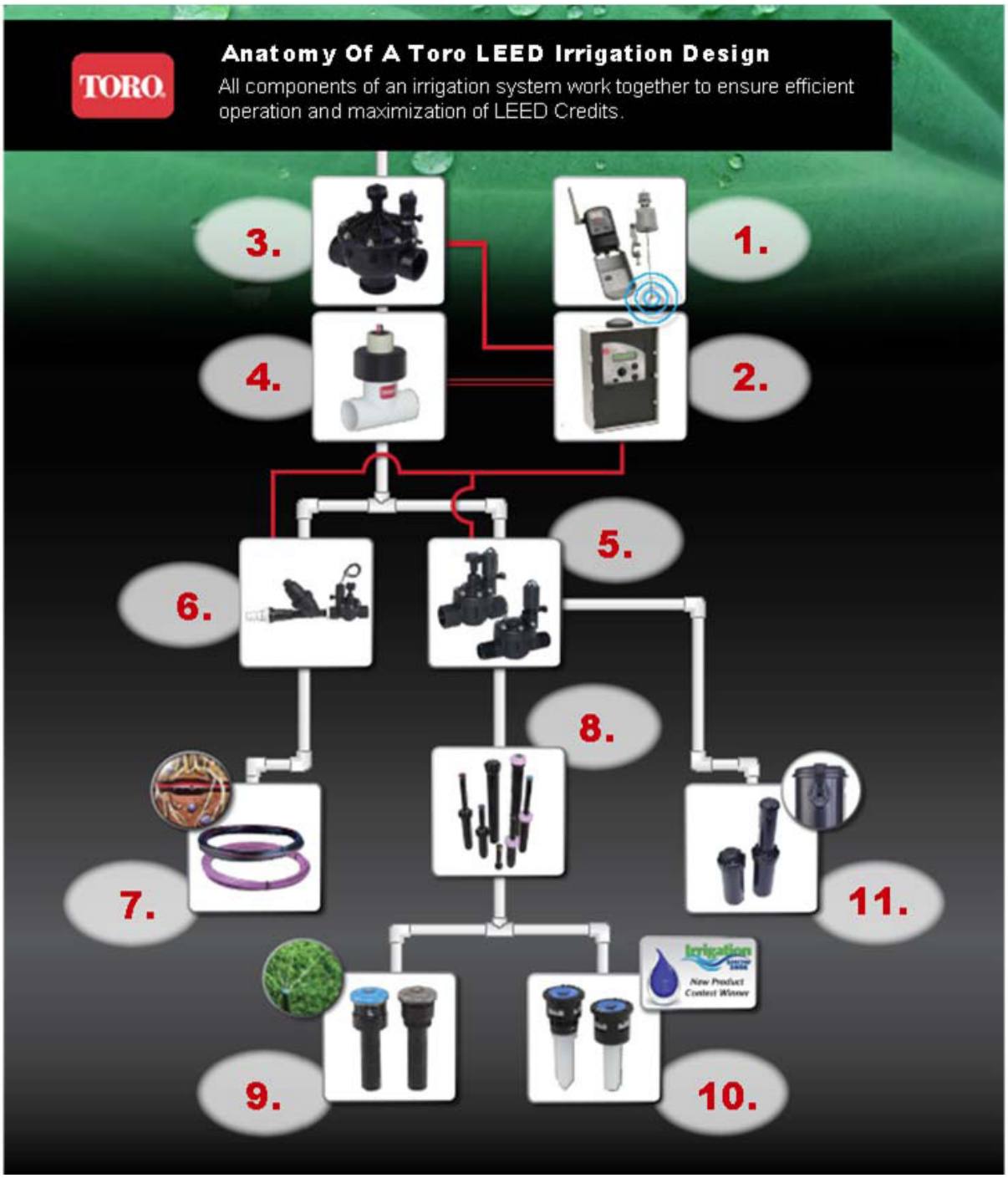
- As part of WE 1.1 Credit, the designer should provide a planting plan, plant list, irrigation product selection, and narrative describing how water consumption is reduced by 50%.
- Irrigation Efficiency is a key component of calculating water use savings. Proper head selection and spacing improves the overall water application efficiency of an irrigation system and minimizes irrigation water runoff.
- Guidance and worksheets for calculating water use can be found in reference guides on the USGBC Website or provided by contacting Toro at LEED@Toro.com.Typically, water savings are calculated based on comparing baseline water use for an "average site" in your area the same size as your design in the month of July (month of highest average ET) versus the expected potable water use of your design in July.
- If the project uses a gray water or storm water reuse system, the estimated volume of reuse for the month of July should be credited as a savings against you potable water use.

EXAMPLE DESIGN:

The Toro Irrigation products discussed in this document, when properly used in an irrigation design, cumulatively help to achieve WE Credit 1.1 - a reduction in water consumption for irrigation by over 50%* from a calculated mid-summer baseline case.

The design examples that follow are for individual products and include estimates of expected water savings. These estimates are supported by the documentation referenced.

***IMPORTANT NOTE:** Water savings stated in this guide are cumulative and based on a system utilizing all products recommended for LEED Designs. Individual product (stand-alone) water savings may be higher or lower than listed. Please contact The Toro® Company if additional water savings details are needed for these or other Toro Irrigation Products.*



1. Wireless Rain/Freeze Sensor with Water Conservation Modes
2. Weather-Adjusting Controller
3. Pressure Regulating Master Valve
4. Flow Sensor
5. Zone Control Valves
6. Drip Zone Kit (Control Valve, Filter, Pressure Regulator)
7. Drip or Micro Irrigation
8. Spray Sprinklers with Pressure Regulation, Check Valve, and X-Flow® Valve-in-Stem
9. Precision™ Series Rotating Nozzles (High Efficiency)
10. Precision™ Series Spray Nozzles (High Efficiency)
11. Rotary Sprinklers (Rotors) with Check Valve

DESIGN EXAMPLE # 1

Product Description	Wireless Rain/Freeze Sensor with Water Conservation Modes
Toro® Product Options	1. Toro TWRFS Wireless Rain/Freeze Sensor 2. Toro TWRS Wireless Rain Sensor (For regions without potential freeze hazard)
Additional Water Savings Provided	5-30% Depending on Regional Average Rainfall Events (Average 10% for LEED Design Specifications – Annual rainfall may drive a higher or lower expected savings.)
References	"ABE325 - Residential Irrigation System Rainfall Shutoff Devices" Michael D. Dukes and Dorota Z. Haman "Expanding Disk Rain Sensor Performance and Potential Irrigation Water Savings" Bernard Cardenas-Lailhacar and Michael D. Dukes, P.E.,

Note: Toro Wireless Rain & Rain/Freeze Sensors with patented Water Conservation Modes have proven to save up to an additional 30% over competitive rain sensors due to intelligent extension of controller "off" time to compensate for differences between sensor and soil dryout times.

Example Savings:

If a system irrigates 1/2 acre of turf and is set to run each zone so that 1/2 inch of water is applied per cycle, one can calculate that 6,789 gallons are being applied over the 1/2 acre of turf per cycle. This is the savings every time the sensor eliminates an irrigation event. If this amount is multiplied by the number of substantial rainfalls that occur in the area over one growing season, a significant amount of water can be saved.

Water Savings may be calculated by estimating yearly water usage, average savings per rain shutdown, and estimated annual rain shutdowns.

Shutdowns due to freezing temperatures may also be utilized for calculated water savings, provided a rain sensor with freeze shutoff is utilized.

DESIGN EXAMPLE # 2

Product Description	Weather-Adjusting Controller
Toro® Product Options	1. Toro Intelli-Sense™ Professional Controllers 2. Toro TriComm™ Web-based Site Management 3. Toro Sentinel® Water Management System
Water Usage	Use of a weather-adjusting controller will ensure irrigation occurs to plan design accounting for landscape coefficients and irrigation efficiencies.
Additional Water Savings Provided	• Weather-Adjusting Controllers can save an additional 20-35% by automatically adjusting irrigation runtimes / frequencies based on ET changes over the course of a year. Add estimated 25% additional water savings if using one of these controllers. • Intelli-Sense Controllers automatically calculate optimum cycle and delay times based on soil type and slope to prevent erosion and runoff. Add 2% additional water savings if using these controllers.
References	"Irrigation by Evapotranspiration-Based Irrigation Controllers in Florida" S. L. Davis, M. D. Dukes, G. L. Miller, 2008) Intelli-Sense Independent Test Results – Available from Toro.

Example Savings

Water Use Reduction Using Weather-Adjusting Controllers

Average U.S. Evapotranspiration

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Daily ET (in/day)	0.02	0.02	0.05	0.09	0.14	0.19	0.21	0.19	0.13	0.08	0.09	0.02
Days in Month	31	28	31	30	31	30	31	31	30	31	30	31
Monthly Avg ET (in/mo)	0.62	0.56	1.55	2.7	4.34	5.7	6.51	5.89	3.9	2.48	0.9	0.62

	Sq. Feet
Assumed Landscaped Size	10,000

	Season	Highest Monthly ET	Sq. Feet	Conv (gal)	Water Usage (3 mon.)	Yearly Usage (gal)
Baseline Usage: (Assume adjust runtimes once per season)	Spring	4.34	10,000	0.6233	81,154	
	Summer	6.51	10,000	0.6233	121,730	
	Fall	3.90	10,000	0.6233	72,926	
	Winter	0.62	10,000	0.6233	11,593	**287,404**

	Month	Highest Monthly ET	Sq. Feet	Conv (gal)	Water Usage (3 mon.)	Yearly Usage (gal)
Weather Adjusted Usage:	January	0.62	10,000	0.6233	3.864	
	February	0.56	10,000	0.6233	3.490	
	March	1.55	10,000	0.6233	9.661	
	April	2.7	10,000	0.6233	16.829	
	May	4.34	10,000	0.6233	27.051	
	June	5.7	10,000	0.6233	35.528	
	July	6.51	10,000	0.6233	40.577	
	August	5.89	10,000	0.6233	36.712	
	September	3.9	10,000	0.6233	24.309	
	October	2.48	10,000	0.6233	15.458	
	November	0.9	10,000	0.6233	5.610	
	December	0.62	10,000	0.6233	3.864	**222,954**
Water Use Reduction (Baseline Usage - Weather Adjusted Usage):						**64,449**
Water Use Reduction %:						**22.4%**

DESIGN EXAMPLE # 3

Product Description	Pressure Regulating Master Valve
Toro® Product Options	1. Toro P220 with EZ-Reg Pressure Regulator 2. Toro 220 Brass with EZ-Reg Pressure Regulator
Non-Potable Indicator	Yes - Available
Additional Water Savings Provided *	5-20% over baseline efficiencies (Assume 5% for LEED Design Specifications – higher savings may be justified based on supply pressure)
References	With a minimum of 10 psi differential (inlet vs. discharge pressure), water usage is reduced by about 1-2% for each 1 psi reduction. http://www.engineeringtoolbox.com/bernouilli-equation-d_183.html

Example Savings:

15H Sprays Regulated to 30 PSI	15H Sprays Non Regulated @ 40 PSI
1.86 GPM	2.27 GPM
10 minutes	10 minutes
18.6 gallons each	22.7 gallons each
20 sprinklers	20 sprinklers
372 gallons per zone	454 gallons per zone
= 82 gallons or 18% savings per cycle	

Note: Water Savings due to Master Valve Pressure Regulation are not realized solely due to volume saved by operating sprinklers at designed operational pressures. Operation at optimum pressures also reduced misting from nozzles and subsequent water loss due to wind drift and sprinkler efficiency is maximized by operating at designed pressures.

DESIGN EXAMPLE # 4

Product Description	Flow Sensor (used in combination with a flow sensing controller)
Toro® Product Options	1. Toro TFS Series Flow Sensor
Additional Water Savings Provided *	Assume 2% for LEED Design Specifications based on expectation of lateral or mainline breaks that are identified and isolated yearly.
References	Hazen-Williams Equation http://www.engineeringtoolbox.com/pvc-schedule-40-pipe-friction-loss-diagram-d_1147.html

Example Savings:

How much water can a flow sensor save if there is a pipe break that is seen and isolated?

Sch 40 Pipe Size	ID (range)	OD	GPM (with minimal pressure loss & noise) Assumes Avg. 40 psi
1/2"	.50-.60"	.85"	14 gpm
1"	1.00-1.03"	1.33"	37 gpm
1.5"	1.50-1.60"	1.90"	81 gpm
2"	1.95-2.05"	2.38"	127 gpm
3"	2.90-3.05"	3.50"	273 gpm
4"	3.85-3.95"	4.50"	480 gpm
6"	5.85-5.95"	6.61"	1100 gpm

DESIGN EXAMPLE # 5

Product Description	Zone Valves
Toro® Product Options	1. Toro EZ-Flo® Valve Series 2. Toro TPV Valve Series
Non-Potable Indicator	Yes - Available
Additional Water Savings Provided *	None. Proper zoning of an irrigation system helps ensure optimum system efficiency.
References	

DESIGN EXAMPLE # 6

Product Description	Drip Zone Valve Kit (Zone Valve, Filter, & Pressure Regulator)
Toro Product Options	1. Toro DZK-TPV-1-LF (1", Low-flow) 2. Toro DZK-TPV-1-MF 3. Toro DZK-EZF-075-LF (¾" EZ-Flo Plus, AVB, Medium-flow) 4. Toro DZK-EZF-075-MF
Non-Potable Indicator	Yes - Available
Additional Water Savings Provided *	Negligible. Water Savings due to pressure regulation assumed to be part of Landscape Drip or Micro Irrigation savings.
References	With a minimum of 10 psi differential (inlet vs. discharge pressure), water usage is reduced by at least 1% for each 1 psi pressure reduction. http://www.engineeringtoolbox.com/bernouilli-equation-d_183.html

DESIGN EXAMPLE # 7

Product Description	Toro Landscape Drip and Micro Irrigation Products
Toro Product Options	1. Toro DL2000® Pressure Compensating Dripline 2. Toro Drip In® Pressure Compensating Dripline 3. Toro NGE® Emitter 4. Toro Turbo-SC® Emitter 5. Toro E-2® Emitter
Non-Potable Indicator	Yes - Available
Irrigation Efficiency	**Minimum IE: 0.700** **Maximum IE: 0.900**
References	"Using Distribution Uniformity to Evaluate the Quality of a Sprinkler System." Brent Mecham (Paper presented at the 25th Annual International Irrigation Show: 2004)

Example Savings:

With an average efficiency of 85% (for drip) compared to 50% efficiency of sprinklers (sprays or rotors), Landscape Drip & Micro Irrigation provide a 35% efficiency improvement.

DESIGN EXAMPLE # 8

Product Description	Fixed Spray with Pressure Regulation, X-Flow®, and Check Valve
Toro® Product Options	1. Toro 570Z-PRX-COM
Design Radius	N/A – Covered By Nozzle Radius
Non-Potable Indicator	Yes - Available
Additional Water Savings Provided *	Assume 5% for LEED Design Specifications
References	With a minimum of 10 psi differential (inlet vs. discharge pressure), water usage is reduced by about 1-2% for each 1 psi reduction. http://www.engineeringtoolbox.com/bernouilli-equation-d_183.html

Example Savings:

Pressure Regulation

15H Sprays Regulated to 30 PSI	15H Sprays Non Regulated @ 40 PSI
1.86 GPM	2.27 GPM
10 minutes	10 minutes
18.6 gallons each	22.7 gallons each
20 sprinklers	20 sprinklers
372 gallons per zone	454 gallons per zone
= 82 gallons or 18% savings per cycle	

Toro X-Flow® Valve-In-Stem

Toro X-Flow stops water loss if a nozzle is missing (vandalism or removal). With usage of X-Flow, you can save:

Small Zone (15 Spray Heads)
0.5% potential for failure per week x 15 heads
= .075 heads/week x 26 week season
= 1.95 heads/season (For easy math, lets say 2 spray heads/season are damaged).

@ 40psi a broken spray can loose 40 gpm. Assume it takes one week before discovered:

Three 15-minute cycles per week
= 45 minutes/week x 40 gallons/minute
= Potential Savings 1,800 gallons / occurrence
= 3,600 Gallons per Season.

Check Valve

Check Valve prevents low head drainage and keeps water in the lines:

- Checks up to 10’ (3m) of elevation = Water is saved for the next irrigation cycle
- A 12-in x 2 inch (id) piece of pipe has a volume of 37.6992 cu in.
  - 1 gal of water = 231 cu in.
  - The 2 inch (id) pipe will hold 0.1632 gal per ft
  - 10’ = 1.6 Gallons saved per cycle

Note: Check Valve savings are only provided if sprinklers are installed on a slope where gravity pressure on a static system will drive water to the sprinklers.

DESIGN EXAMPLE # 9

Product Description	Multi-Stream, Multi-Trajectory Rotating Spray Nozzles
Toro® Product Options	Toro Precision™ Series Rotating Nozzles 1. PRN-TA/TF (Male-threaded) 2. PRN-A/F (Female-threaded)
Design Radius	14' – 26'
Non-Potable Indicator	N/A – Covered by Spray Head Indication
Irrigation Efficiency	**Minimum IE: 0.600** **Maximum IE: 0.750**
References	"Using Distribution Uniformity to Evaluate the Quality of a Sprinkler System." Brent Mecham (Paper presented at the 25th Annual International Irrigation Show: 2004)

Example Savings:

Multi-Stream, Multi-Trajectory Rotating Sprinklers have a higher Distribution Uniformity and Lower Scheduling Coefficient than MPR spray nozzles by other manufacturers (including Toro), which result in higher overall efficiently and less water use.

Other system improvements that might further increase water conservation include the elimination of runoff and the elimination of overspray (water sprayed outside the boundary of the area to be irrigated). Sprinkler features that would help to achieve these benefits are lower precipitation rates, adjustable settings for arc of coverage and radius of throw, and the ability to maintain matched precipitation rates while making these adjustments.

DESIGN EXAMPLE # 10

Product Description	High Efficiency Spray Nozzles
Toro Product Options	1. Toro Precision™ Series Spray Nozzles See Catalog – 5 Radii, 9 Arcs per Radius, + Specialty Nozzles
Design Radius	5' – 15'
Non-Potable Indicator	N/A – Covered by Spray Head Indication
Irrigation Efficiency	**Minimum IE: 0.650** **Maximum IE: 0.800**
References	"Using Distribution Uniformity to Evaluate the Quality of a Sprinkler System." Brent Mecham (Paper presented at the 25th Annual International Irrigation Show: 2004)

Example Savings:

With an average DU (distribution uniformity) of 70% and an average SC (scheduling coefficient) of 1.25, the Precision Series Spray nozzles are 20% more efficient than MPR spray nozzles by other manufacturers (including Toro), which are approximately only 50% efficient.

DESIGN EXAMPLE # 11

Product Description	Rotary Sprinkler with Check Valve
Toro® Product Options	1. Toro T5 with Check Valve (T5PCK)
Design Radius	25′ – 50′
Non-Potable Indicator	Yes - Available
Irrigation Efficiency	Minimum IE: 0.550 Maximum IE: 0.750
Additional Water Savings Provided *	Assume 2% for LEED Design Specifications
References	"Using Distribution Uniformity to Evaluate the Quality of a Sprinkler System." Brent Mecham (Paper presented at the 25th Annual International Irrigation Show: 2004)

Example Savings:

Check Valve

Check Valve prevents low head drainage and keeps water in the lines:

- Checks up to 10′ (3m) of elevation = Water is saved for the next irrigation cycle
- A 12-in x 2 inch (id) piece of pipe has a volume of 37.6992 cu in.
  - 1 gal of water = 231 cu in.
  - The 2 inch (id) pipe will hold 0.1632 gal per ft
  - 10′ = 1.6 Gallons saved per cycle

Note: Check Valve savings are only provided if rotary sprinklers are installed on a slope where gravity pressure on a static system will drive water to the sprinklers.

Basic Estimated Water Use Reduction – Example Only:

1. BASELINE POTABLE WATER USE:

Highest Monthly ET (July) (inches)	Sq. Feet Landscape	Conv. (to gallons)	Water Usage (gallons)
0.21"/Day = 6.51"	5,000	0.6233	20,288

2. DESIGN POTABLE WATER USE:

Landscape Type	Area (S_F)	Species Factor (k_s)	Density Factor (k_d)	Sprinkler Type	IE	Microclimate	Microclimate Factor (k_{mc})	K_L	ET_L	TWA (gallons)
Native Shrubs	2,000	0.5	1.0	Precision Series Spray	0.750	Shady 75%	0.75	0.4	0.08	4,058
Warm Season Turf	1,000	0.7	1.0	Precision Series Rotating	0.650	Sunny 100%	1.50	1.1	0.22	6,556
Native Trees	1,750	0.5	1.0	Drip	0.900	Sunny 100%	1.50	0.8	0.16	5,918
High Use Annuals	250	0.9	1.0	Drip	0.900	Sunny 75%	1.25	1.1	0.24	1m,268
Total	**5,000**								**TWA**	**17,800**

3. BASELINE POTABLE WATER USE:

Assume 0 Gallons for This Example

4. WATER SAVINGS

$$\frac{\text{Baseline Use - Design Use}}{\text{Baseline Use}} = \frac{20{,}288 - 17{,}800}{20{,}288} = \frac{2{,}488}{20{,}288} = \textbf{12.3\% Savings}$$

5. IRRIGATION PRODUCT SAVINGS

Product	Additional Savings
Toro® Wireless Rain/Freeze Sensor	10%
Toro Intelli-Sense™ Professional Controller (Weather Adjusting + Cycle / Delay)	25% + 2%
Toro P220 Pressure Regulating Master Valve	5%
Toro TFS Series Flow Sensor	2%
Toro 570Z PRX Sprays	5%
TOTAL SAVINGS	**52%**

6. BASELINE POTABLE WATER USE:

12.3% Design Savings + 52% Product Selection Savings = **64.3% Water Use Reduction**

Other Potential Leed Credit Points Related to Irrigation & Landscape

Water Efficiency Credit 1.2: Water Efficient Landscaping; No Potable Water Use or No Irrigation (2 points in addition to WE 1.1)

If the irrigation system design is intended to use no potable water (designed utilizing only public agency supplied non-potable water and/or rainwater / greywater harvesting), Toro® has irrigation products specifically designed for operation in these environments. Benefits included materials resistant to the chemicals used to treat reclaimed water and optional identifiers (lavender-colored markings) denoting non-potable water in use. The Toro Residential/ Commercial Irrigation Specifier Catalog (part #11-1001-IRC) identifies models with Effluent (non-potable) Indicators. The following Toro Products meet these requirements:

Category	Model	Non-Potable Water Applicability
Sprays	570 Series	Optional Effluent Water Indicators (Lavender)
Rotor	300 Series	Optional Effluent Water Indicators (Lavender)
	340 Series	Optional Effluent Water Indicators (Lavender)
	Super 800 Series	Optional Effluent Water Indicators (Lavender)
	T5 Series	Optional Effluent Water Indicators (Lavender)
	TR50XT Series	Optional Effluent Water Indicators (Lavender)
	T7 Series	Optional Effluent Water Indicators (Lavender)
	TR70 Series	Optional Effluent Water Indicators (Lavender)
	TR70XT Series	Optional Effluent Water Indicators (Lavender)
	TS90 Series	Optional Effluent Water Indicators (Lavender)
	640 Series	Optional Effluent Water Indicators (Lavender)
Valves	EZ-Flow®	Chloramine-resistant Diaphragm
		Optional Effluent Solenoid Assembly & Tag (Lavender)
	TPV	Chloramine-resistant Diaphragm
		Debris-resistant design optimal for dirty-water applications.
		Optional Effluent Solenoid Assembly & Tag (Lavender)
	250/260 Series	Optional Effluent Flow Control Handle (Lavender)
	254/264 Series	Optional Effluent Flow Control Handle (Lavender)
	252 Series	Optional Effluent Flow Control Handle (Lavender)
	P220 Series	Filter Screen enables use in dirty-water environments.
		Optional Effluent Solenoid Assembly & Tag (Lavender)
	220 Brass Series	120-Mesh, Stainless Steel Filter Screen (self-flushing) enables use in dirty-water environments.
		Optional Effluent Solenoid Assembly & Tag (Lavender)
	Quick Coupler Series	Optional Effluent Cover (Lavender)
Drip Irrigation	DL2000® Dripline	Available in Lavender-colored Tubing for Effluent applications
	Blue Stripe® Polyethylene Hose	Available with Lavender Stripe for Effluent Applications

Points for Irrigation Strategies

Innovation & Design Credit 1: Innovation in Design

Additional points may be achieved for Innovation in Design by explaining unique features of specific Toro® irrigation products (for 'Innovation in Design' credits) and/or use of these products in landscaping strategies which demonstrate quantifiable environmental benefits above and beyond the Water Efficiency requirements already set by the LEED Green Building Rating System.

Check valves on rotor and spray nozzle can be used to provide environmental benefits of saving water above and beyond the Water Efficiency requirements already set by the LEED Green Building Rating System.

Example Savings:

Check Valve on Sprayhead or Rotor

1. Calculating the Annual Baseline Water Budget (BWB) for a site. Baseline Water Budget is the amount of water required to meet the horticultural need.

BWB = (ETo) (0.62) [(0.8 x LA) = _____ Gallons

Rainfall Adjustment = 25% of Annual Rainfall (AR)

Adjusted Baseline Water Budget = 0.25xARXWB

ETo = Site Specific Evapotranspiration (annual inches)

0.8 = Cool Season Turf Grass Plant Factor

LA = Total Landscape Area (square feet)

0.62 = Conversion factor (to gallons)

AR = Annual Rainfall

2. Calculate Annual Water Loss From Low-Head Drainage

Size PVC Pipe	Cubic Inches In 100' Length	Gallons In 100' Length	1000 Feet	Daily water loss per irrigation cycle
¾"	2,121	9.2	92	92
1"	3,770	16.3	163	163
1¼"	5,890	25.5	255	255
1½"	8,482	36.7	367	367
2"	15,080	65.3	653	653

Site's daily water loss		A
Site's yearly water cycles		B
Site's length of pipe divide by 1,000		C
% draining from pipes (*Site with high degree of slopes will have more water draining from pipes. If unknown assume 50%)*		D
Water lost through pipe drainage Ⓐ * Ⓑ * Ⓒ * Ⓓ		

Yearly water saving using check valves = **Water lost through pipe drainage** / **Annual Baseline Water Budget**

Sustainable Credits 5.1: Site Development: Protect or Restore Habitat – (1 point)
Efficient irrigation systems and landscape design can play a key role in conserving existing natural areas and restoring damaged areas. Irrigation design that eliminates runoff protects habitats from pollution and associated harm. Use of native plants in landscape design can potentially provide habitat space and foster the restoration of habitats.

Sustainable Sites Credit 6.1: Stormwater Design: Quantity Control – (1 point)
Limiting disruption of natural water hydrology and manage storm water runoff can earn points for Sustainable Sites Credit 6.1. Irrigation systems designed to utilize rainwater harvesting as an irrigation source can eliminate stormwater run-off by using all captured rainwater and run-off for irrigating the landscape.

Sustainable Sites Credit 7.2: Heat Island Effect – (1 point)
Battery operated irrigation controllers (Toro DDCWP) and Landscape drip or Micro irrigation systems can be utilized for "green" roofs or rooftop gardens, provided benefit towards achieving Sustainable Sites Credit 7.2.

Energy and Atmosphere Credit 1: Optimize Energy Performance – (Up to 10 points)
Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use. Up to 10 points can be awarded based on the percentage improvement over the prerequisite requirements. Landscaping design can have a significant impact on HVAC requirements due to the cooling effects of landscape and turf, especially shading of buildings with mature trees. The overall temperature of urban areas may be as much as 5 to 7oC warmer than that of nearby rural areas. Through the cooling process of transpiration, turfgrasses dissipate high levels of radiant heat in urban areas. The transpirational cooling effect of green turfs and landscapes can save energy by reductions in the energy input required for interior mechanical cooling of adjacent homes and buildings ("The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans" - James B. Beard and Robert L. Green, 1994).

RP Credit 1: Regional Priority (1–4 Points)
Earn 1-4 of the 6 Regional Priority credits identified by the USGBC regional councils and chapters as having environmental importance for a project's region. A database of Regional Priority credits and their geographic applicability is available on the USGBC website, http://www.usgbc.org. One point is awarded for each Regional Priority credit achieved; no more than 4 credits identified as Regional Prioritycredits may be earned. Projects outside of the U.S. are not eligible for Regional Priority credits.

Materials and Resources Credit

Use materials with recycled content such that the sum of postconsumer recycled content plus 1/2 of the preconsumer content constitutes at least 10% or 20%, based on cost, of the total value of the materials in the project. The minimum percentage materials recycled for each point threshold is as follows:

Recycled Content	Points
10%	1
20%	2

Product	Recycled Content
Toro 100P-1 and 100P-1.5	15%
Toro 570z Spray (570Z-12P-PRX-E, 570Z-6P-XF-E, 570Z-4P-PRX-E)	20%
Toro Blue Stripe® Hose	20%
Toro Drip In® PC Dripline	20%
Toro DL2000® PC Dripline	20%

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