

# **Rainwater Management Strategies**

**Vancouver Island Plumbing Code Committee  
Plumbing Officials Association of BC  
Nanaimo, BC  
June 22, 2015**

**Ken Nentwig BLA MLA CLP CLD**

**Governor, BC Jurisdiction, CANARM  
Rainwater Harvesting National Certification Program**

**Education Committee, ARCSA  
Education and Training: in-class and online**

**Gaia College  
Rainwater Management online course  
(Humber and Seneca Colleges, ON; Royal Roads University, BC)**

**KDA, Rainwater Harvesting Consulting  
System Design / Site Planning  
RWH Entrepreneur Mentoring**



**ARCSEA**

**American Rainwater  
Catchment Systems Association**



**Canadian Association for  
Rainwater Management**



- *Introduction to Rainwater*
- *Accredited Professional Program*
- *Design and Construction Workshops*
- *Inspection Specialist Program*
- *Rainwater Harvesting Master Program*

**MERGED EDUCATIONAL and  
TRAINING PROGRAMS**

# What Can Rainwater Be Used For?

## NATIONAL PLUMBING CODE

- Toilet/Urinal Flushing
- Sub-surface Irrigation

## BC PLUMBING CODE

- Toilet/Urinal Flushing
- (Irrigation '*under review*')

## ONTARIO BUILDING CODE

- Toilet/Urinal Flushing; Priming Traps
- Sub-surface irrigation
- Clothes Washing; Laundry Trays
- Mop Sinks; Hose Bibbs
- Water Closets; Bedpan Washers

# Codes and Regulations/Standards/Guidelines

## National Plumbing Code (2010)

### 2.7.4.2.(1) and(2)

Specifies that rainwater may be used to supply water closets, urinals and directly connected underground irrigation systems that only dispense water below the surface of the ground.

*(No rainwater and/or non-potable water quality standards or treatment requirements are specified by the 2010 NPC.)*

## B.C. Plumbing Code (2012)

### 2.7.4.2.(1)

Non-potable water systems shall be designed, fabricated and installed in accordance with good engineering practice, such as that described in the ASHRAE Handbooks, ASPE Handbooks and CAN/CSA-B128.1, “Design and Installation of Non-Potable Water Systems.

### 2.7.4.2.(2)

Reserved

# Codes and Regulations/Standards/Guidelines

National Plumbing Code (2010)  
2.7.1.1. and 2.7.2.1.

Specify that rainwater pressure pipes shall not be connected to potable water pipes and that rainwater shall not discharge into a sink, or where a potable outlet discharges or food/drink is prepared.

*also refers to... CSA 64.10....*

CSA Standard 64.10, Appendix B, Table B1  
5.3.4.3(a)

Specifies that a dual check valve (DuC) shall be used to isolate a residential premise with access to an auxiliary water supply (the RWH system), if there is no direct connection between the auxiliary water supply and the potable supply.

B.C. Plumbing Code (2012)

2.7.1.1.

A non-potable water system shall not be connected to a potable water system.

2.7.1.2

The location of non-potable water discharge and non-potable water piping shall be identified by markings that are permanent, distinct and easily recognized.

ANSI  
ASHRAE

*American National Standards Institute  
American Society of Heating, Refrigerating and Air-  
Conditioning Engineers*

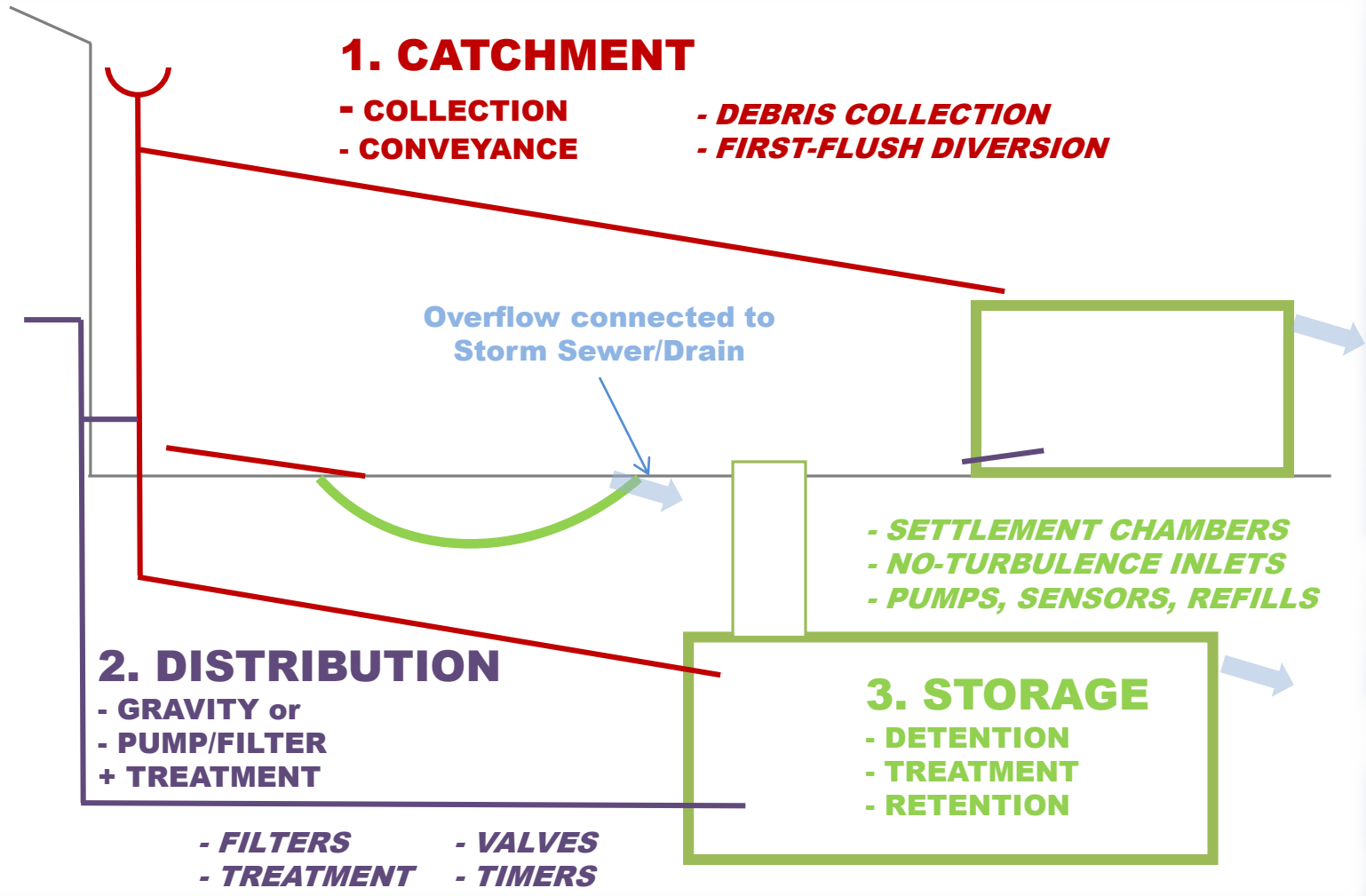
ASPE  
CAN/CSA  
NSF

*American Society of Plumbing Engineers  
Canadian Standards Association (CSA Group)  
National Sanitation Foundation*

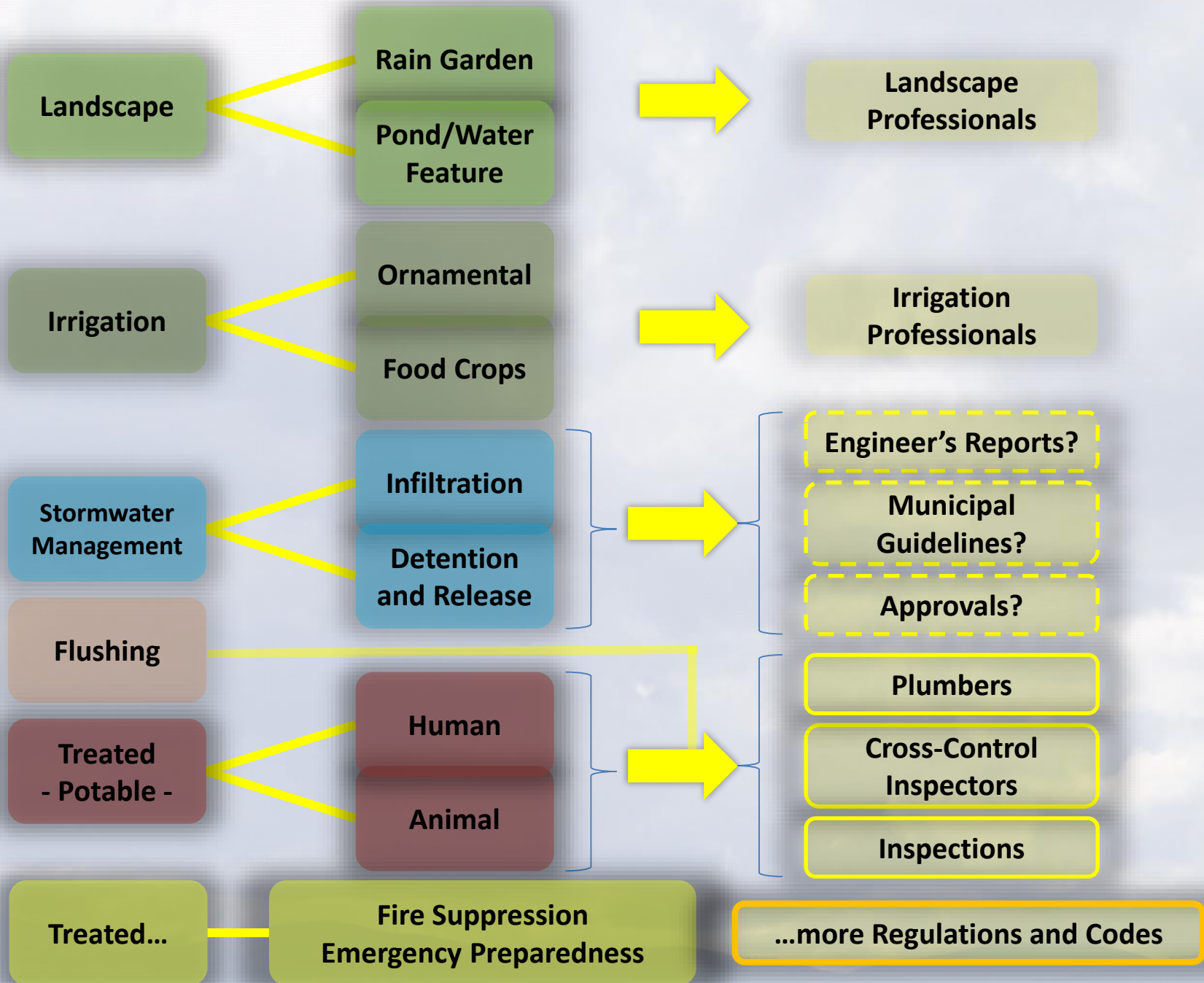
# Codes and Regulations/Standards/Guidelines

- NATIONAL/PROVINCIAL PLUMBING CODES (Building/Electrical Codes; Municipal bylaws)
- ARCSA/ASPE/ANSI 63-2013  
Plumbing, Engineering & Design Standard; Rainwater Catchment Systems
- CMHC Publication 67608  
Guidelines for Residential Rainwater Harvesting Systems
- REGIONAL DISTRICT of NANAIMO  
Rainwater Harvesting Best Practices Guidebook
- INTERNATIONAL GREEN CONSTRUCTION CODE
- TEXAS A&M AgriLife Extension: Rainwater Harvesting: System Planning
- ARCSA Training Manual (November, 2015)
- ICC/CSA 'Rainwater Harvesting Systems Standard' (2016)

# RWH Systems – Overview







Rain Garden



**PASSIVE (ie. no storage, no pump)**

**EXTERNAL**



**Stormwater Management**

**Infiltration**

**Rainwater re-introduced to the soil, infiltrates and percolates, replenishes ground water sources and aquifers**

**Detention and Release**

**Rainwater detained in temporary storage, released slowly into soil (infiltration) or into storm drain system**

**PASSIVE (ie. no storage, no pump)**

**EXTERNAL**

Pond/Water  
Feature



**ACTIVE (storage; pump)**

**EXTERNAL**

Irrigation

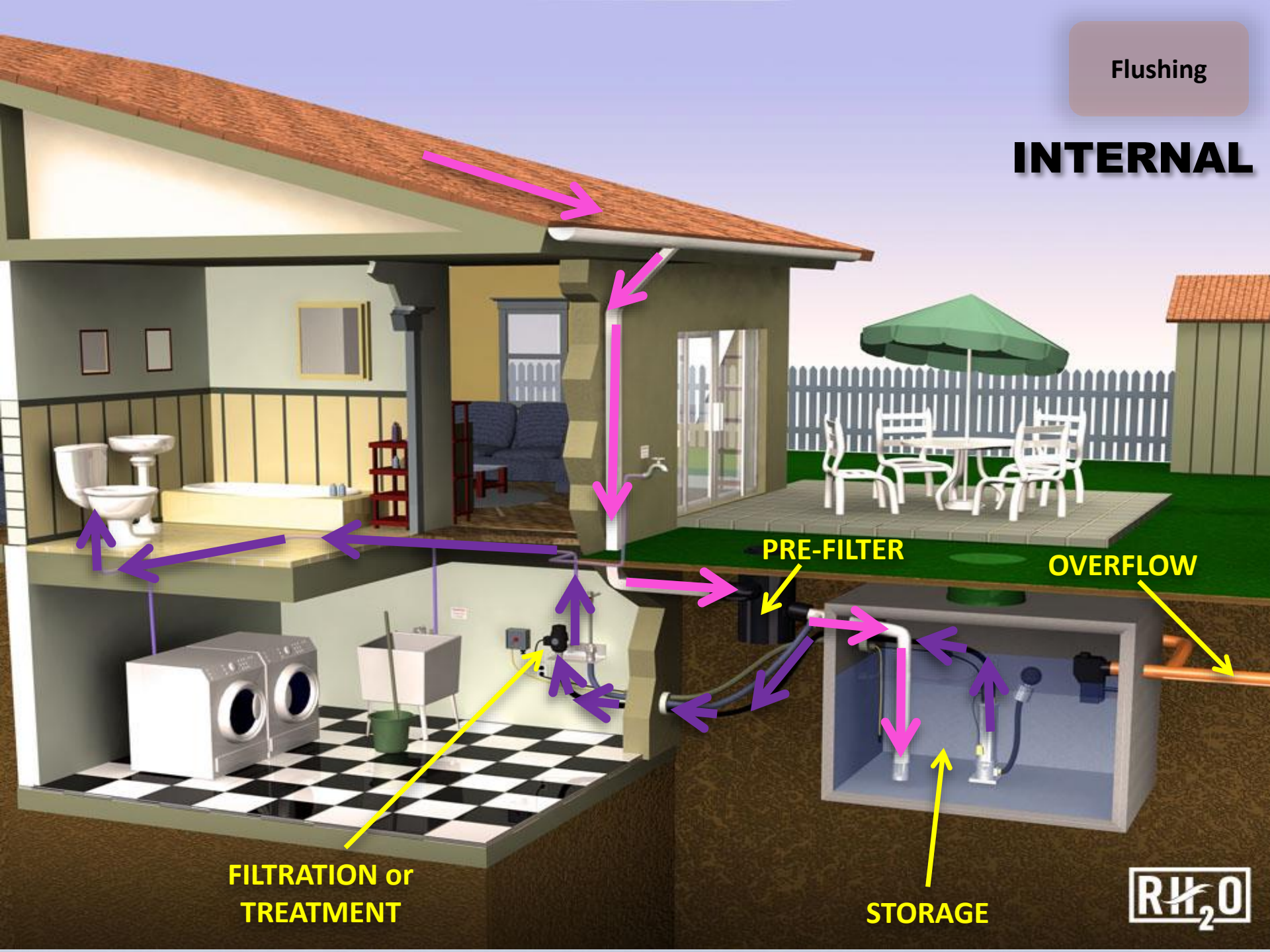


**ACTIVE (storage; pump)**  
**CODES (spray, surface, sub-surface)**

**EXTERNAL**

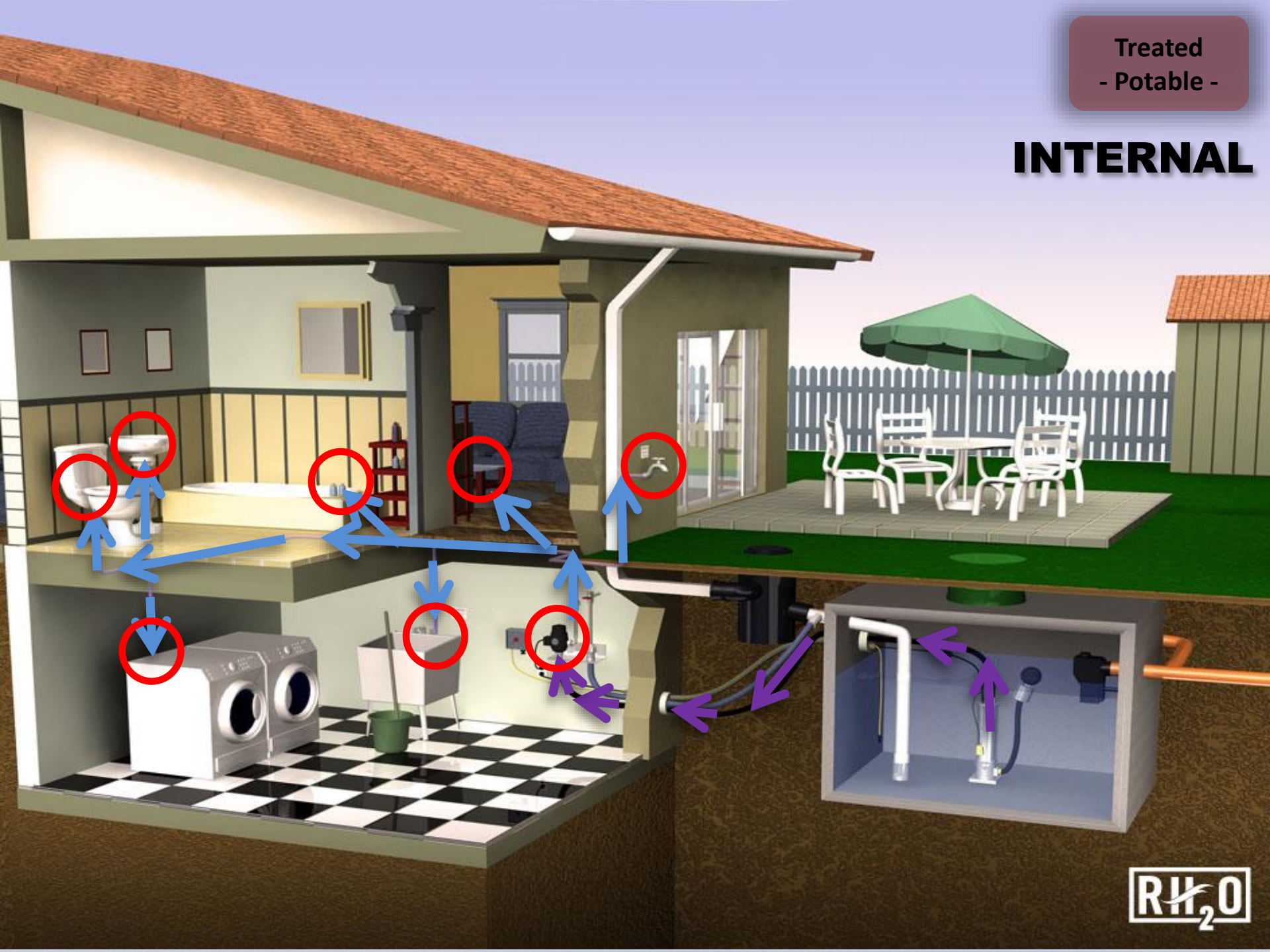
Flushing

# INTERNAL

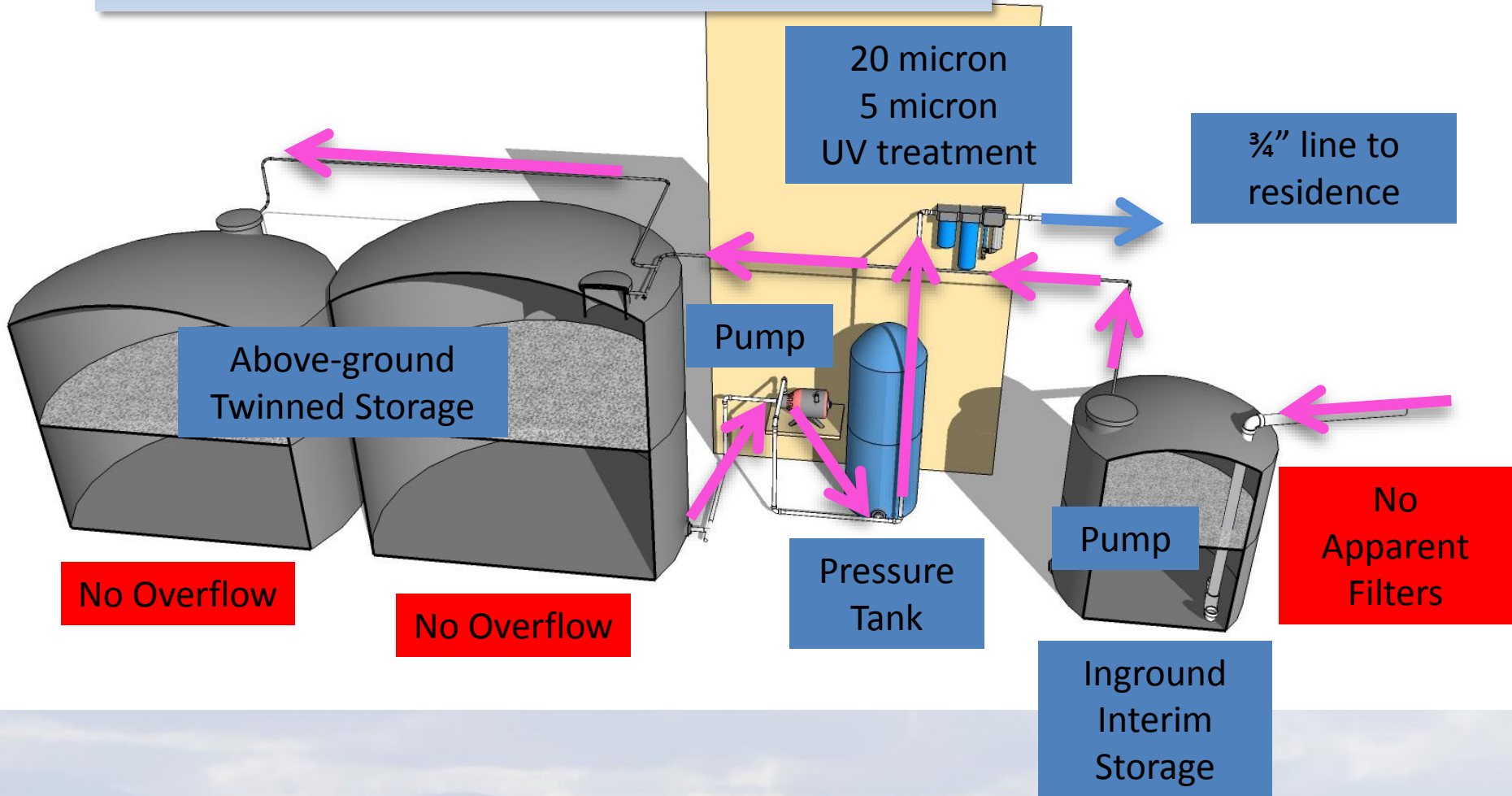


Treated  
- Potable -

# INTERNAL



# Existing rainwater system providing potable water for residence



**ACTIVE (storage and pump)**

**INTERNAL**



# Existing rainwater system providing potable water for residence

RAINWATER SYSTEM MECHANICAL CABINET

RAINWATER SYSTEM SHED

PROPERTY, WATER SIDE

GUTTER SCREEN

Pre-filter

"DANGER: CONFINED SPACE" "DO NOT ENTER"

FIRST-FLUSH / VORTEX FILTER UNIT

Overflow

First-Flush (280 microns)

Waste

20 micron  
5 micron  
UV treatment

INSULATED WALL

Overflow

LOW-LEVEL FLOAT SWITCH

Pump

Overflow (to storm drain)

CALMING INLET

BOOSTER PUMP - 10 gpm

Pressure Tank

3/4" line to residence

VECTOR FILL PIPE (SAME AS INLET)

PRESSURE TANK, CONTROL, and

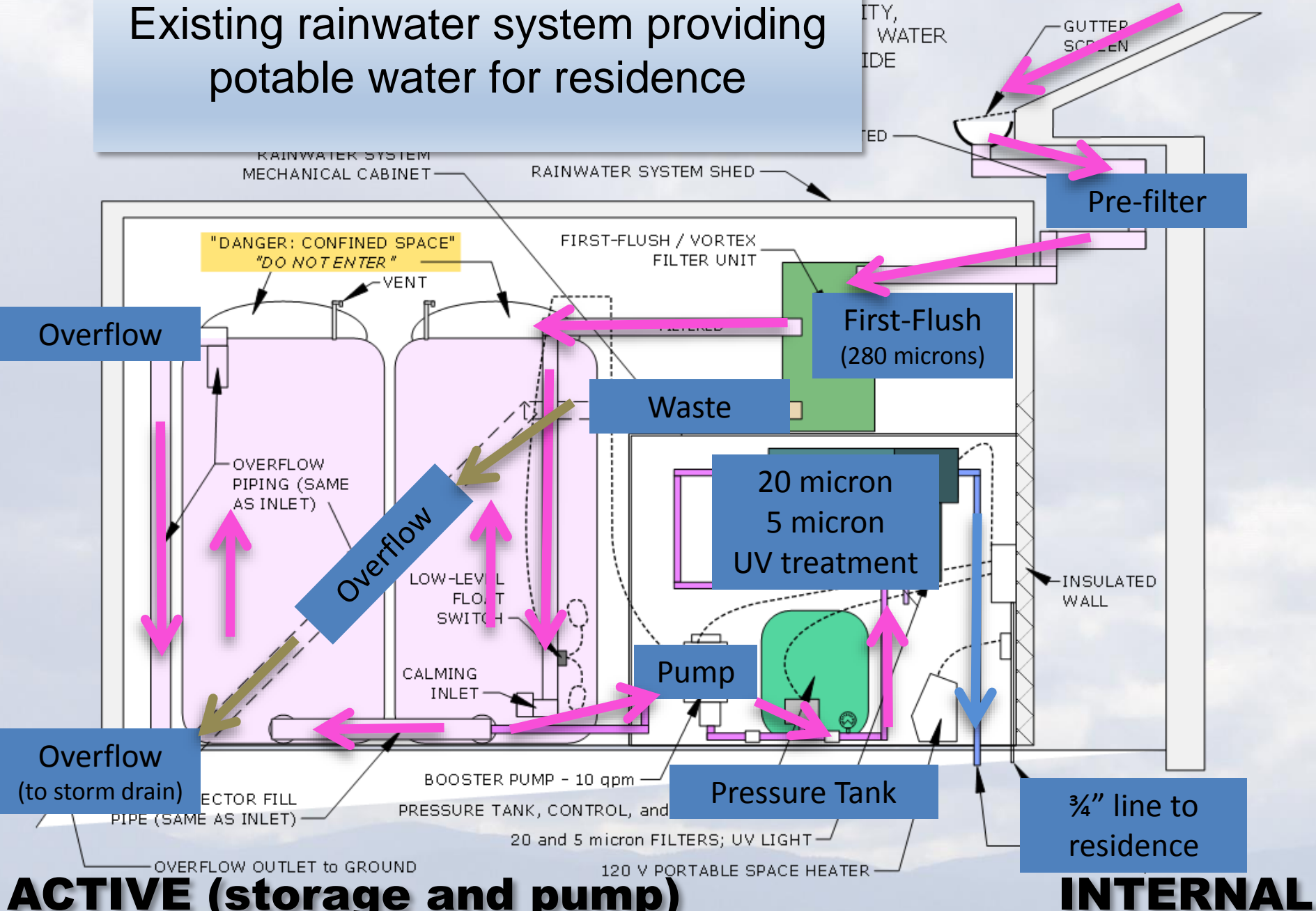
20 and 5 micron FILTERS; UV LIGHT

OVERFLOW OUTLET to GROUND

120 V PORTABLE SPACE HEATER

**ACTIVE (storage and pump)**

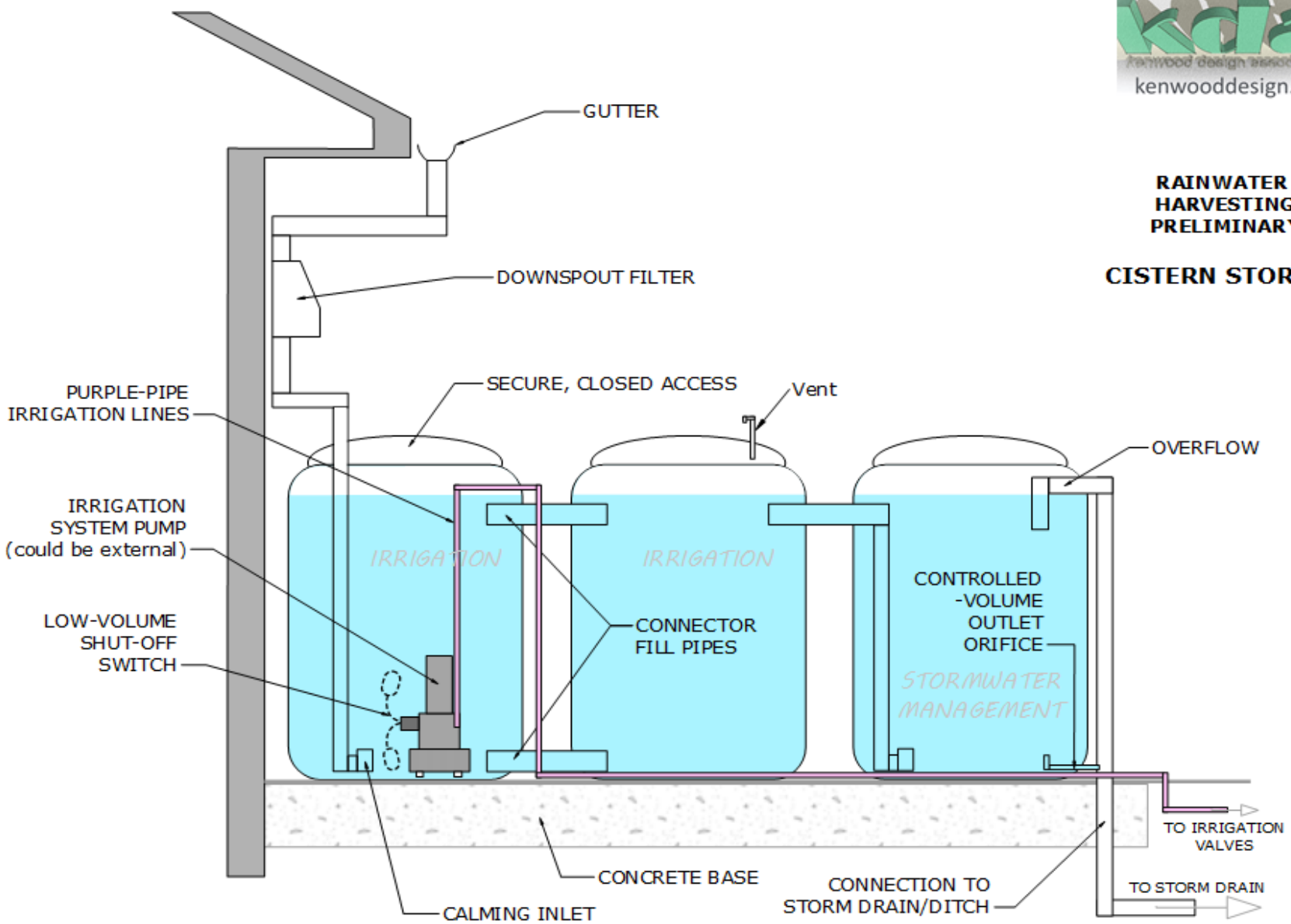
**INTERNAL**





RAINWATER HARVESTING PRELIMINARY

CISTERN STORAGE



**ACTIVE (storage; pump)**

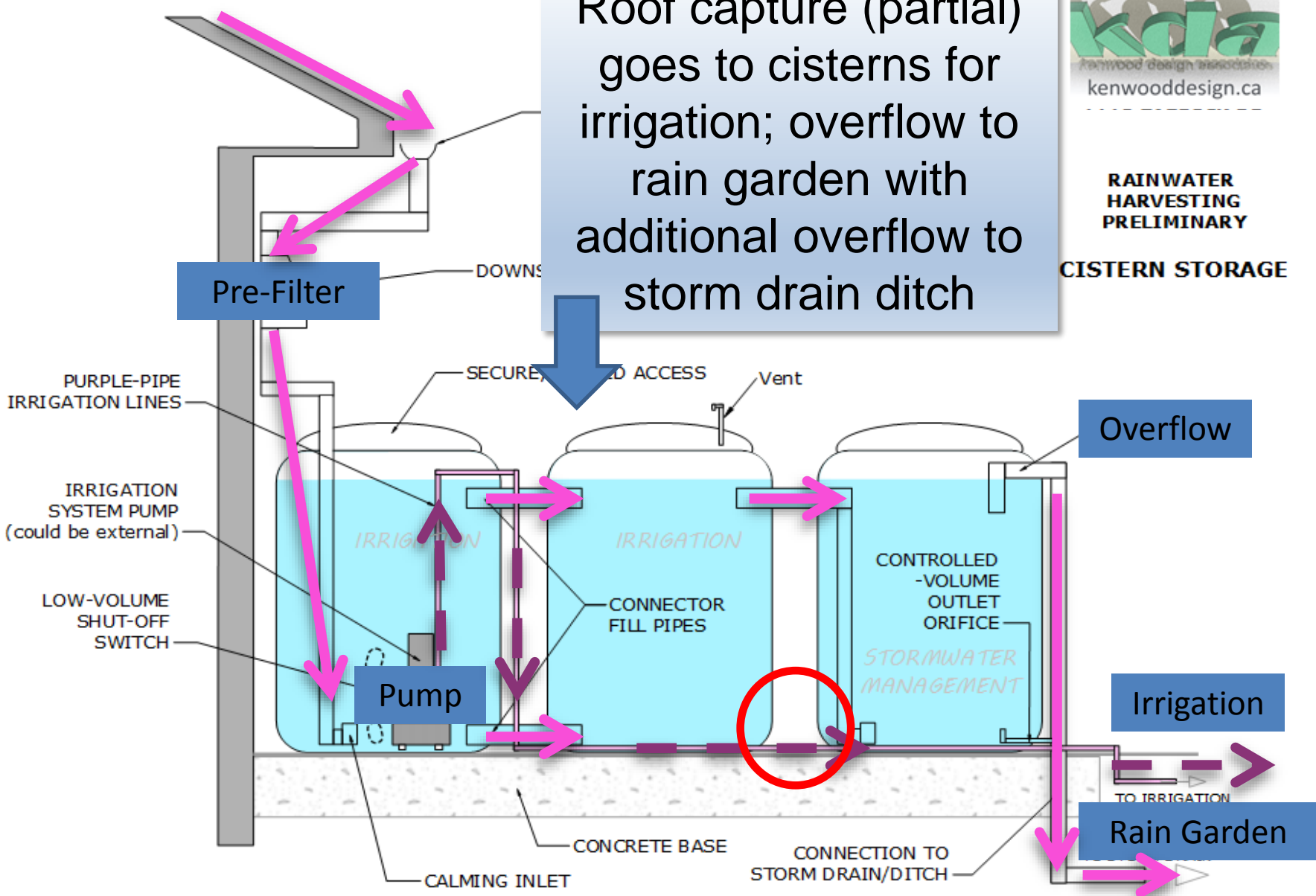
**EXTERNAL**



Roof capture (partial) goes to cisterns for irrigation; overflow to rain garden with additional overflow to storm drain ditch

RAINWATER HARVESTING PRELIMINARY

CISTERN STORAGE



Pre-Filter

DOWNSPOUT

PURPLE-PIPE IRRIGATION LINES

SECURE ACCESS

Vent

Overflow

IRRIGATION SYSTEM PUMP (could be external)

IRRIGATION

IRRIGATION

CONTROLLED -VOLUME OUTLET ORIFICE  
STORMWATER MANAGEMENT

LOW-VOLUME SHUT-OFF SWITCH

Pump

CONNECTOR FILL PIPES

Irrigation

Rain Garden

CONCRETE BASE

CALMING INLET

CONNECTION TO STORM DRAIN/DITCH

TO IRRIGATION

ACTIVE (storage; pump)

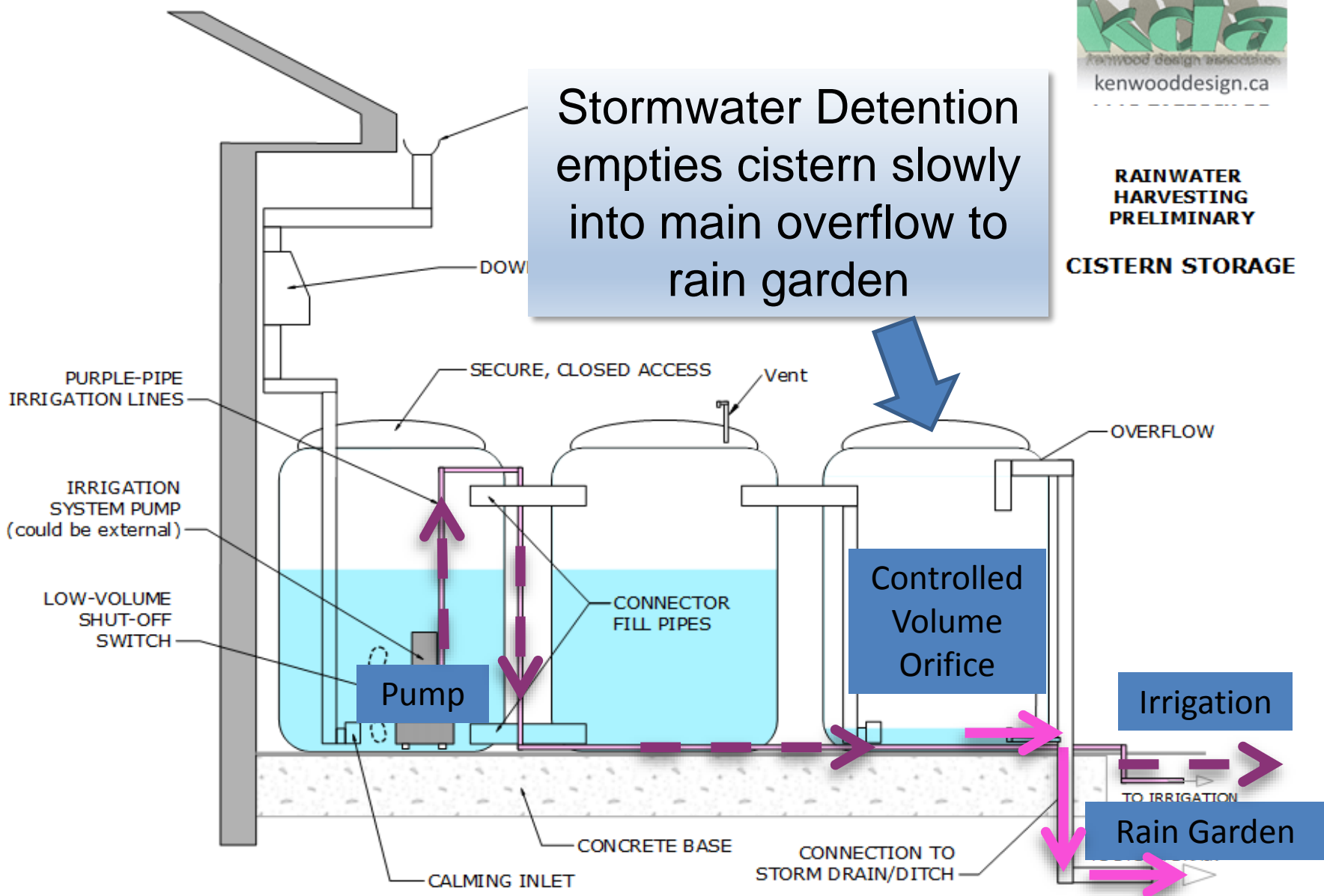
EXTERNAL



Stormwater Detention empties cistern slowly into main overflow to rain garden

RAINWATER HARVESTING PRELIMINARY

CISTERN STORAGE



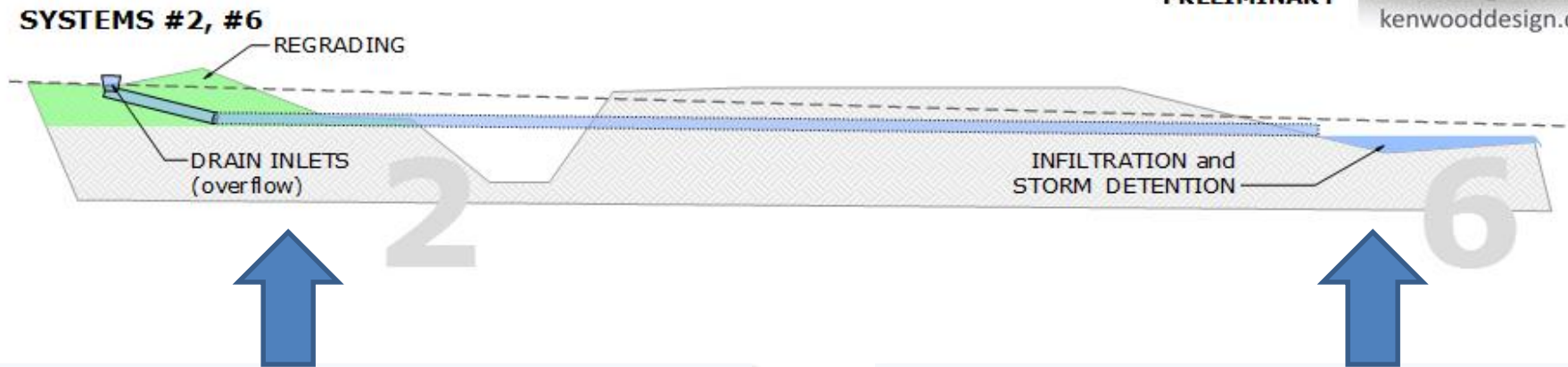
ACTIVE (storage; pump)

EXTERNAL

# SYSTEMS 2 and 6 of 6

SYSTEM SCHEMATICS

RAINWATER HARVESTING PRELIMINARY



Excess/ponding surface water runoff intercepted and drained to rain garden for infiltration (assumed polluted)

Rain Garden for infiltration, has overflow to storm drain ditch system

**PASSIVE**

**EXTERNAL**

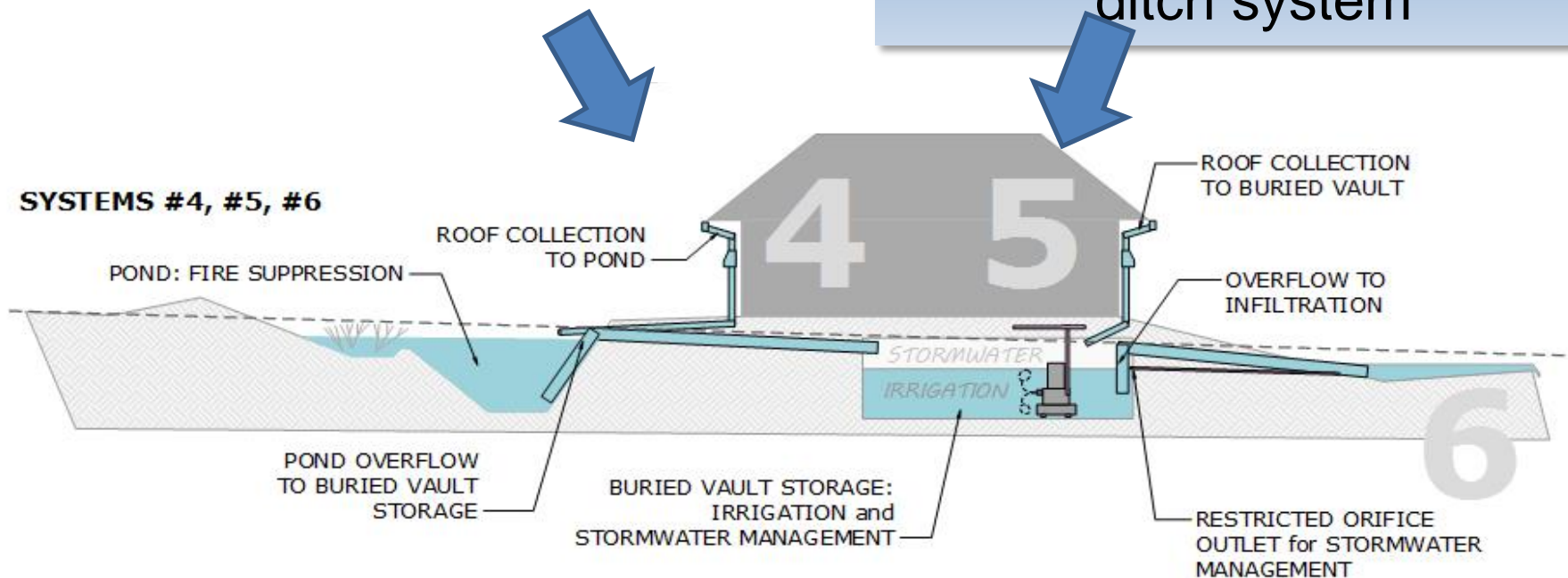


Ground water captured and used to fill pond; overflow to rain garden at front



Roof capture (partial) goes to pond; overflow to in-ground vault/cistern for irrigation

Roof capture (partial) goes to in-ground vault/cistern for irrigation; verflow to rain garden, with additional overflow to storm drain ditch system

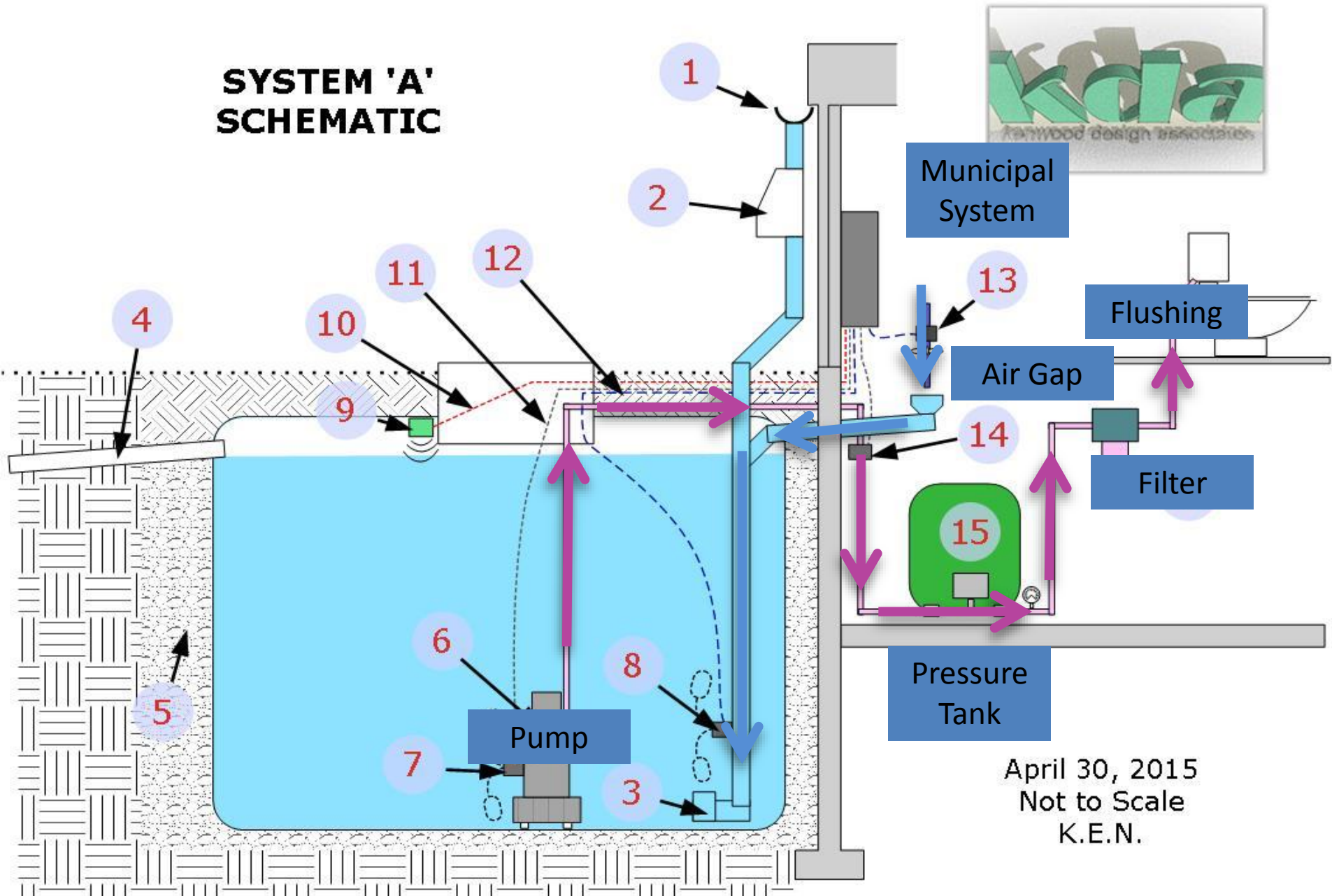


SYSTEMS #4, #5, #6

**PASSIVE & ACTIVE**

**EXTERNAL**

# SYSTEM 'A' SCHEMATIC

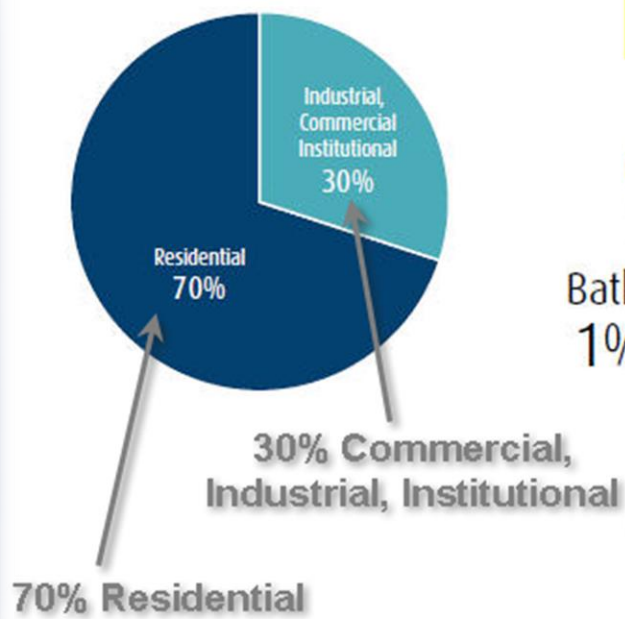


**ACTIVE (storage; pump)**

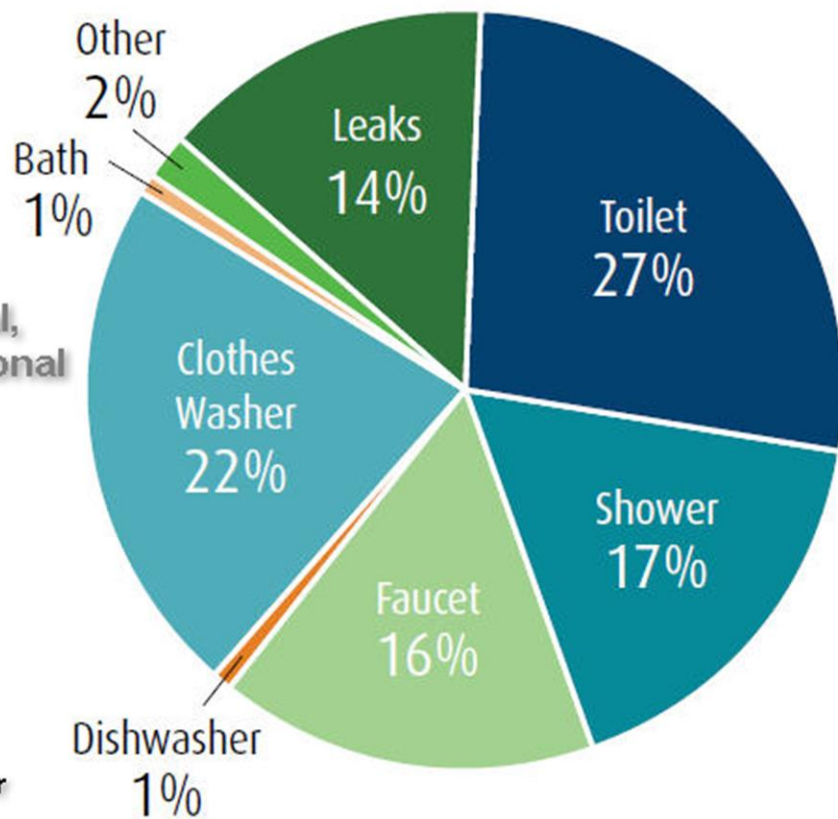
**INTERNAL**



How we use our water  
— by sector

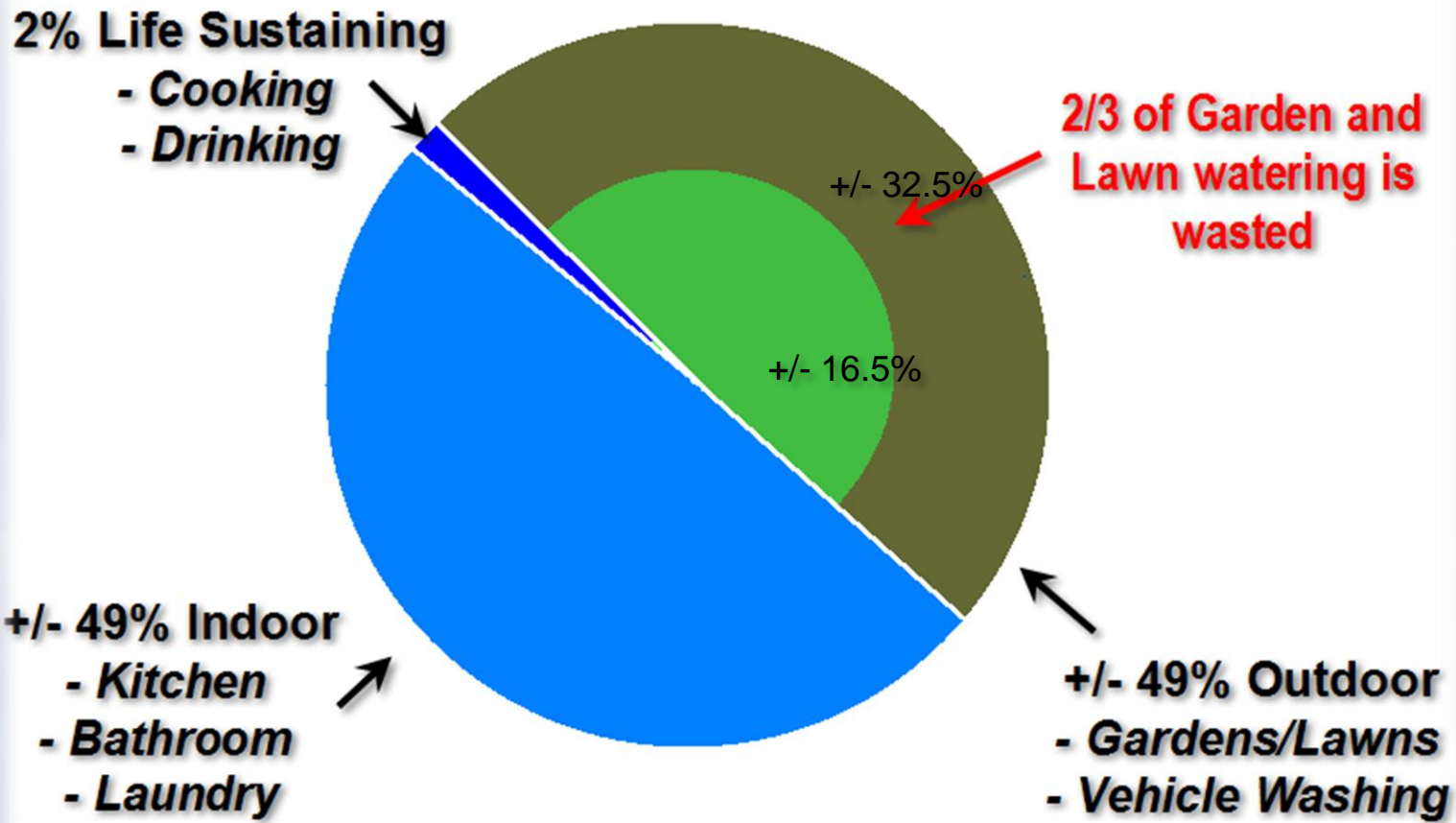


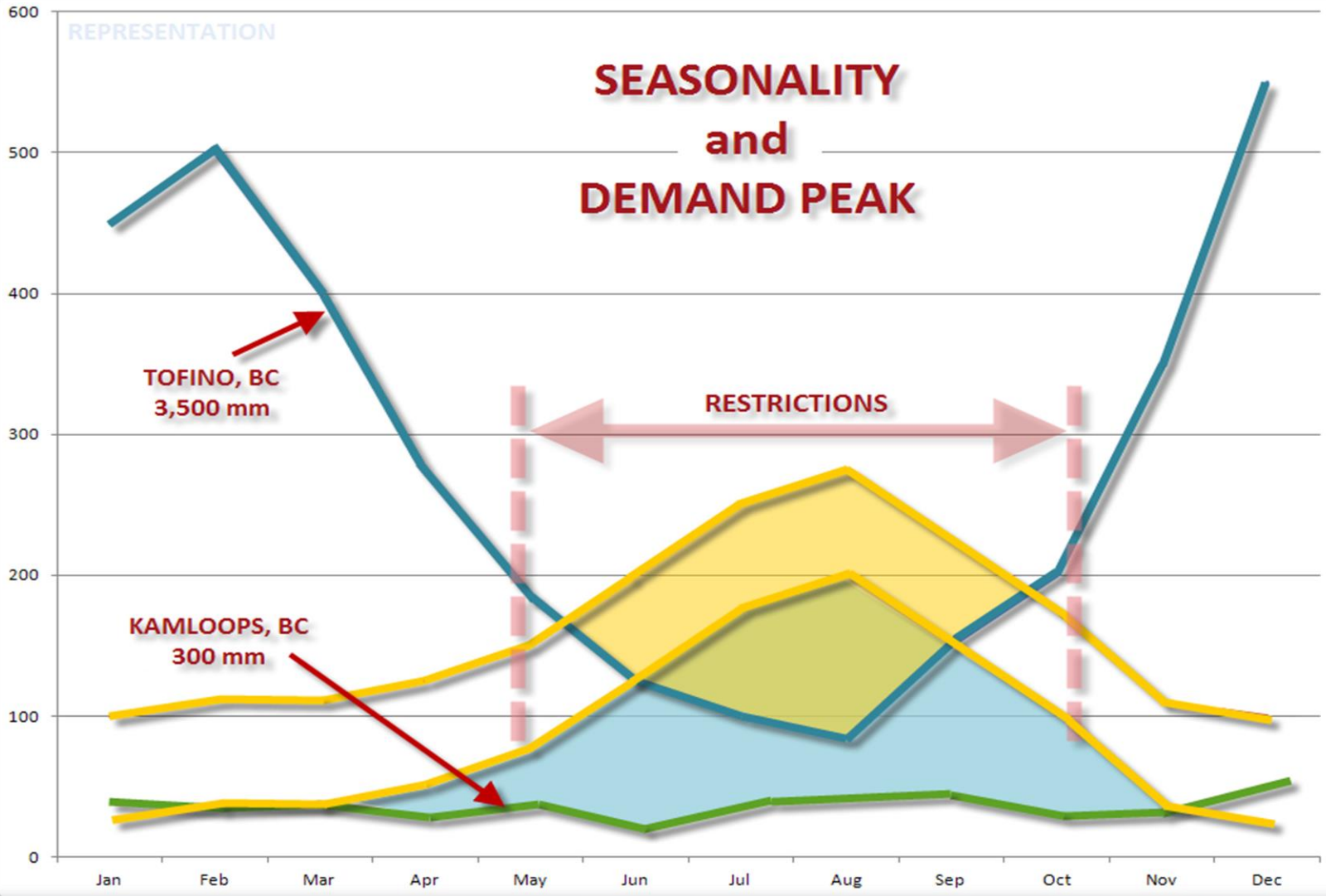
## Breakdown of indoor water use



CRD: "A Homeowner's Guide to Outdoor Water Use" - April 2009

# Breakdown of residential water use

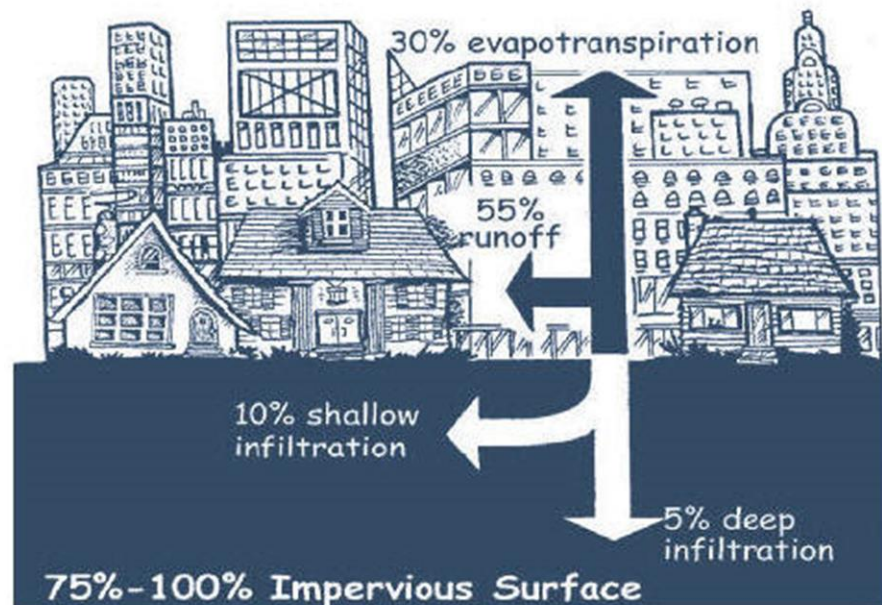
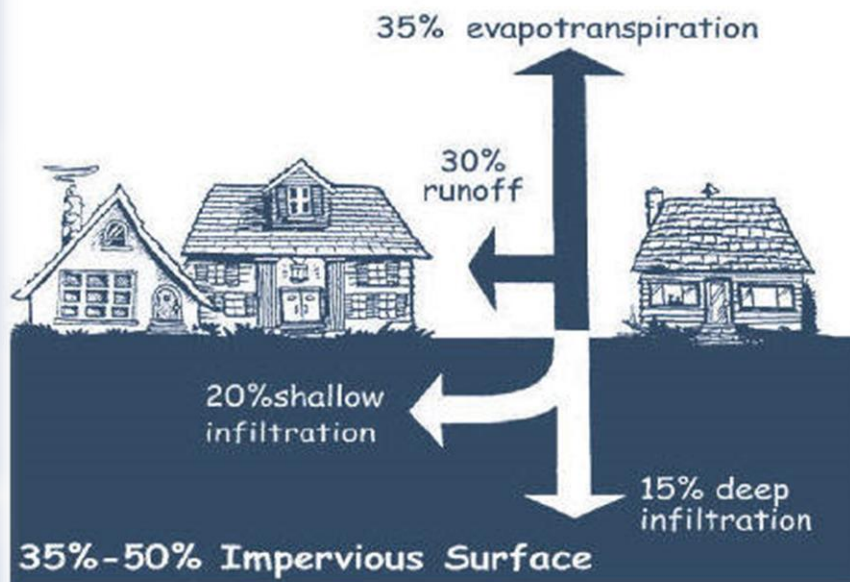
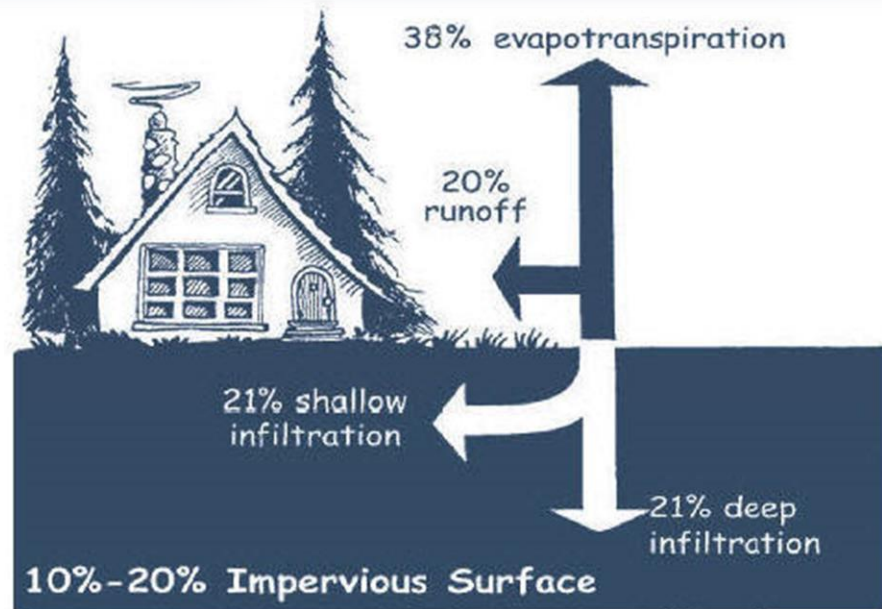
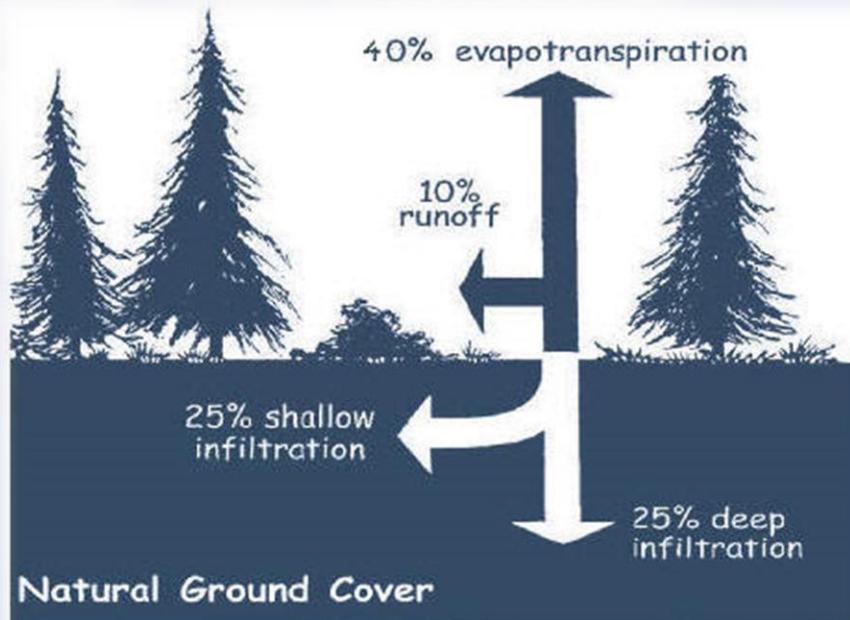




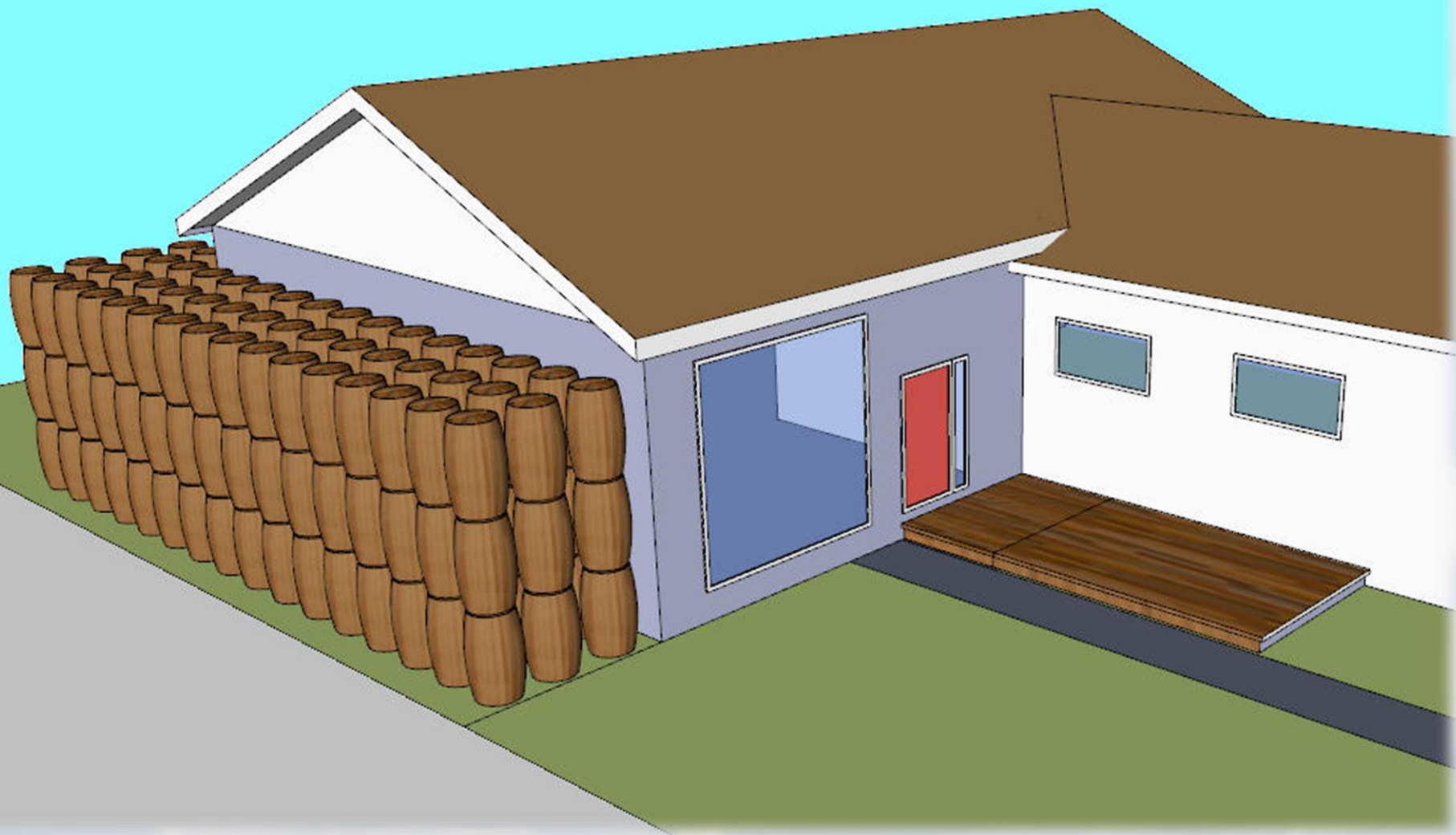
# **RAINWATER is....**

- Available almost everywhere, most of the time
- Generally clean, relatively uncontaminated
- Can be stored and/or treated
- Is an 'untapped' resource
- can help to solve or mitigate a number of problems





# *How-to-do-it... or not!*





***Cisterns***

# *Designer Tanks and Cisterns*





***Back yard  
becomes a  
cistern.....***



***...cistern  
becomes a  
yard  
ornament***

# *Landscape*



# ***Permeable Pavements***





Site Planning  
Rainwater Harvesting Systems  
RWH Project Management  
Education and Training (ARCSA, GAIA)

**[www.kenwooddesign.ca](http://www.kenwooddesign.ca)**  
**[www.rainwatercanada.ca](http://www.rainwatercanada.ca)**  
**[ken.nentwig@gmail.com](mailto:ken.nentwig@gmail.com)**  
**250 999 2472**



**[www.canarm.org](http://www.canarm.org)**  
**[ken@canarm.org](mailto:ken@canarm.org)**  
**604 757 1805**

Consultants/Installers  
Training Programs  
Information.....