RDN Green Building Speakers Series, Sept. 21, 2013

Using "Sky Water" For Gardening… and Indoors

- Why more of us are catching the rain
- How much can I collect and use?
- What's involved? What does it look like?
- How can I build one?
- Using rainwater indoors – more need for clean water & disinfection

RDN Green Building Speakers Series
Sept. 21, 2013

Prepared by Bob Burgess
The Rainwater Connection

THE RAINWATER CONNECTION

- 13 Years of designing, building and servicing rainwater systems
- Extensive testing of available products
- Development and manufacturing of our own components
- Engineer approved Rainwater Permits for Potable Systems
- Actively promoting rainwater use thru' presentations, workshops, User's Guides and demonstration projects

Connected Barrels and Small Pump

2001 Garden Watering Rainwater System

Linked barrels with RV style pump.

Large Scale Irrigation Systems

Who is catching the rain

The Rainwater Connection has recently installed 5 Garden Systems with 16,000 – 40,000 imp. gallon cisterns (73 – 182 m^3)

A Rapid Growth in RWH (Rainwater Harvesting)

For Urban and Rural Homes

Who is catching the rain

A Rapid Growth in RWH

…and for commercial and industrial too

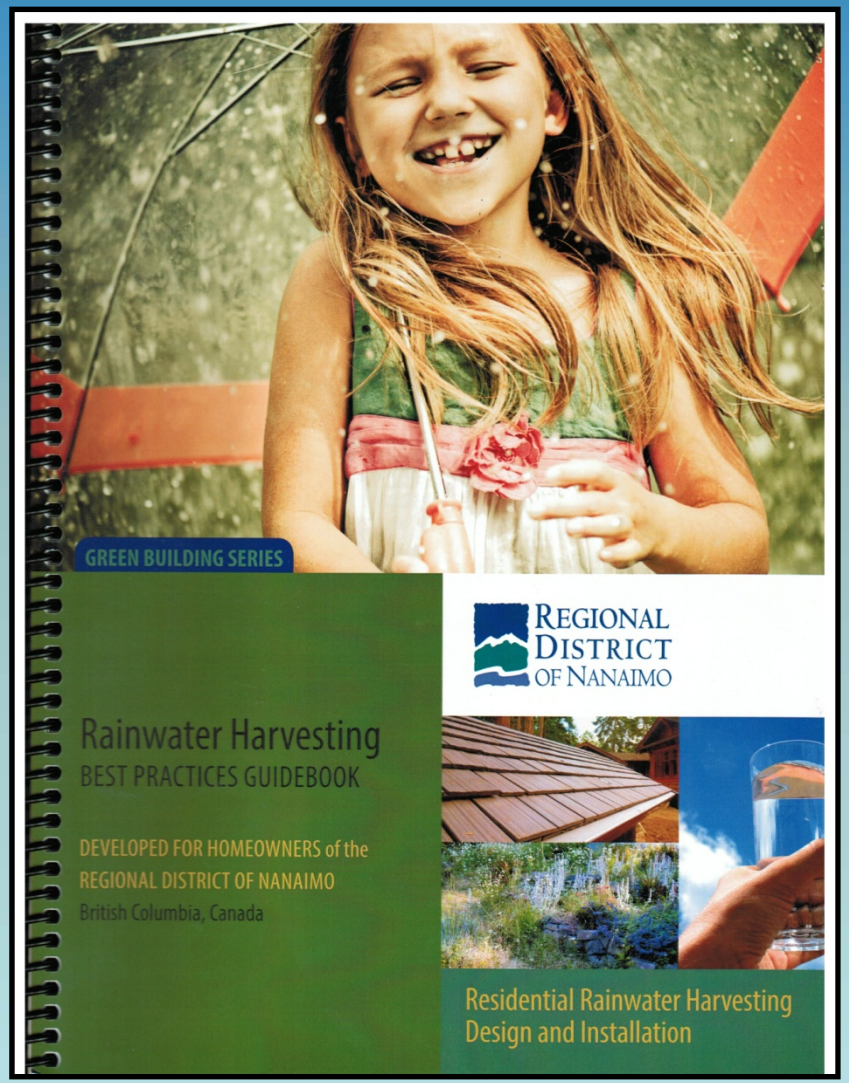
Who is catching the rain

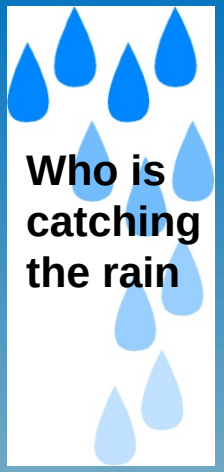
Kirkstone Place Subdivision near Nanaimo BC

Up to 23 homes with rainwater as their only indoor water supply

COMMUNITY FORUM SEPT 26

Local Government Support and Legislation





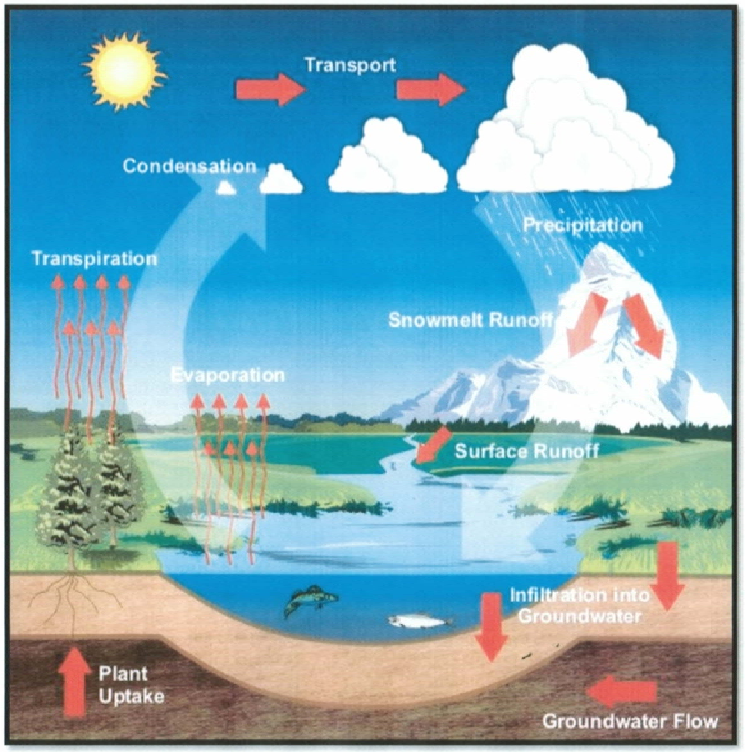
Rainwater Harvesting Guidebook by the Regional District of Nanaimo (RDN)
...and mandatory storage tanks in water short areas.

Reasons for Rainwater Harvesting

The Rainwater Harvester's Mantra

Store excess water in winter to use in summer when groundwater levels drop

"We forget that the water cycle and the life cycle are one." Jacques Cousteau



Reasons for Rainwater Harvesting

Green

Reduced volume of groundwater drawn from aquifers during the summer helps sustain stream water levels and prevents salt water intrusion into wells

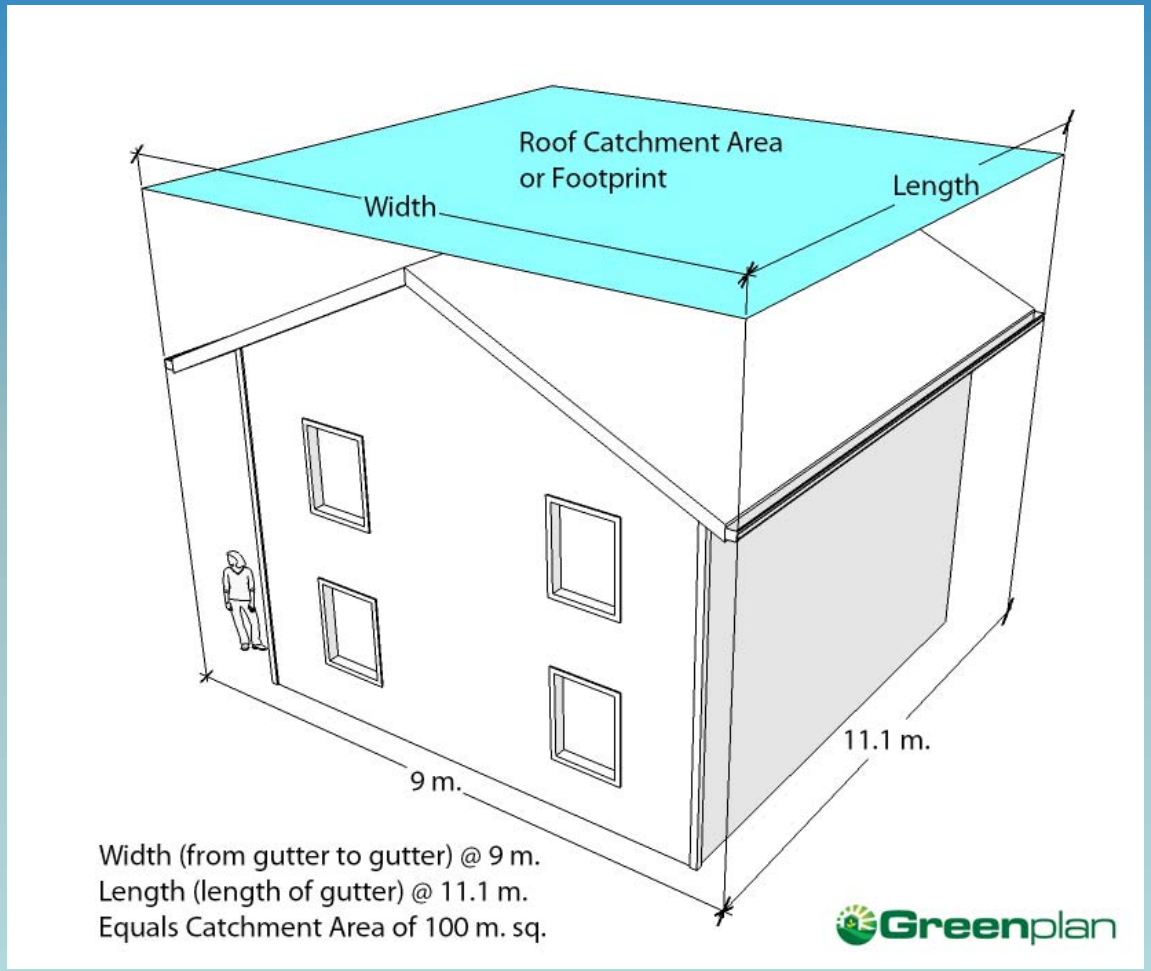
A easy way to support sustainability in our own backyard

Public $ Savings

Reduced peak hour summer demand can delay the need for costly water utility expansions

...and

A RWH system can significantly reduce Storm Water flow rates in urban areas



Rain Supply

(80% comes in the winter)

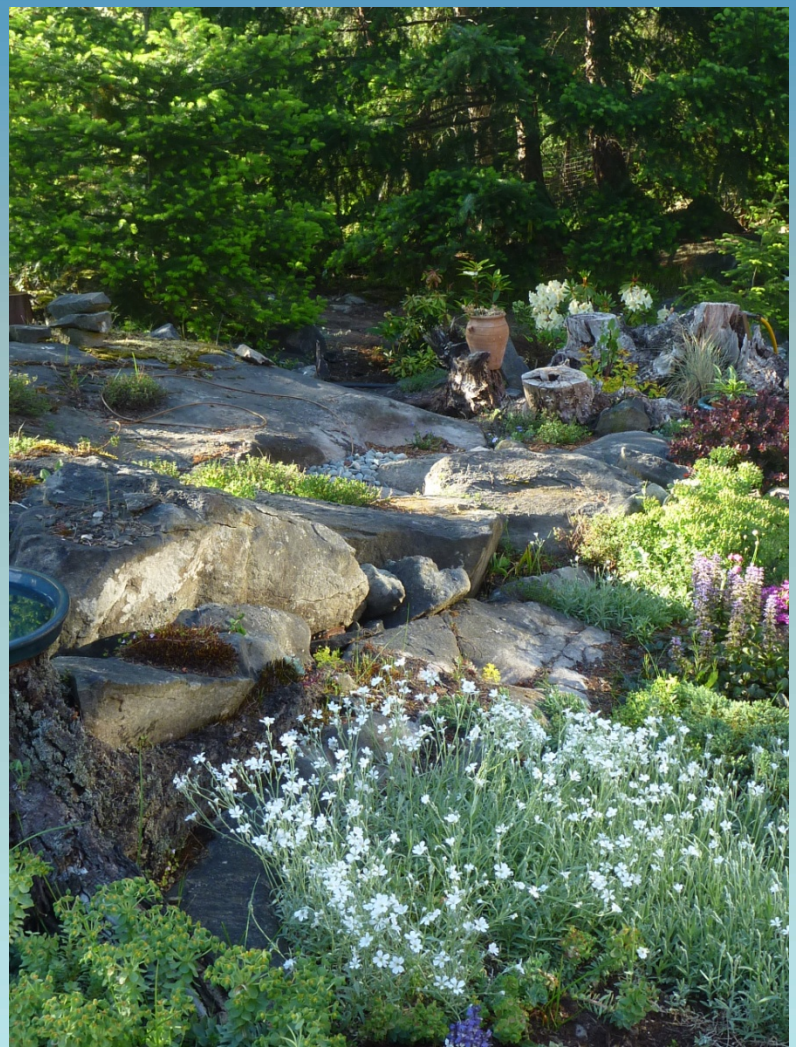
1” on 1 SF = 0.52 gal
With 38.8” rain
1,000 SF Roof yields
15,130 gal/yr (@75%)

1mm on 1m^2 = 1 litre
With 986 mm rain
100m^2 Roof yields
74m^3 /year (@75%)[13]

38.8” X 0.52 X 1,000SF = 20,176 X 75% = 15,132 Imp Gal (68.8m^3)

Water the Garden with Rainwater

And pressure wash in spring & fall



Typical garden use :

- 30 deck pots
  820L (180 gal) /month
- 150 SF flower bed around Patio
  1,410L (310 gal) /month
- Small Vegetable Garden
  910 L (200 gal)/ month

(assumes 1” water per week)

Outdoor water from 1000 SF May 2013.xls
Monthly Water Balance Table

Location: St Mary's Lake Rain Stats (1981-2006)
Property: Typical Location north of Ganges

Collection Area #1 (sqft)	1,000
Collection Area #2 (sqft)	0
Collection Area #3 (sqft)	0
TOTAL Collection Area	1000
	92.9m2

Scenario Outdoor Use with 1,000 gal tank from 1,000 SF Roof. Steel roof in clear site accounting for pollen season shut down.

Volume Units: gal
Choose one of gal or litre

Max Storage Cap (gal): 1,000 — 4.55m3

Assumed Rainfall Level: Avg
Enter 10% : 20% : 30%: 50%: Max : Avg :Min

Month	Indoor Useage gal/mon	Outdoor Useage gal/mon	Assumed Rainfall inches	Assumed Collection Efficiency	Rainfall Collected gal/mon	Alternate Supply gal/mon	Storage Volume gal/mon
Start							80
October	0	1400	3.7	75%	1442	0	122
November	0	0	6.6	85%	2920	0	1000
December	0	0	6.0	85%	2644	0	1000
January	0	0	6.4	85%	2816	0	1000
February	0	0	3.9	85%	1725	0	1000
March	0	1200	3.5	65%	1178	0	978
April	0	500	2.2	50%	581	0	1000
May	0	600	1.7	75%	660	0	1000
June	0	600	1.5	75%	574	0	974
July	0	800	0.9	65%	308	0	483
August	0	800	1.1	65%	388	0	71
September	0	500	1.3	75%	509	0	80
TOTAL	**0**	**6,400**	**38.8**		**15,747**	**0**	**9,347**
							Surplus
Demand	**6,400**			**Supply**	**15,747**		Supply

From 1,000 SF Roof Area and 1,000 gal Cistern

Rain Supply

630 gal (2.9m3) per month in summer.

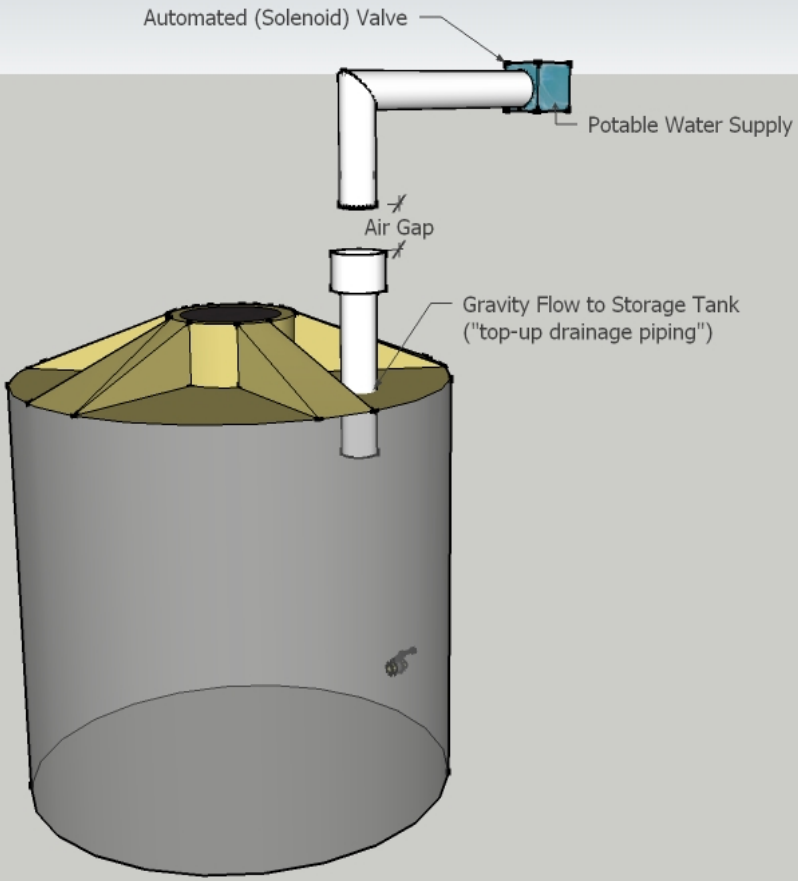
Plus 2,600 gal for Outdoor Cleaning

Save 6,400 gal (29m³) per year

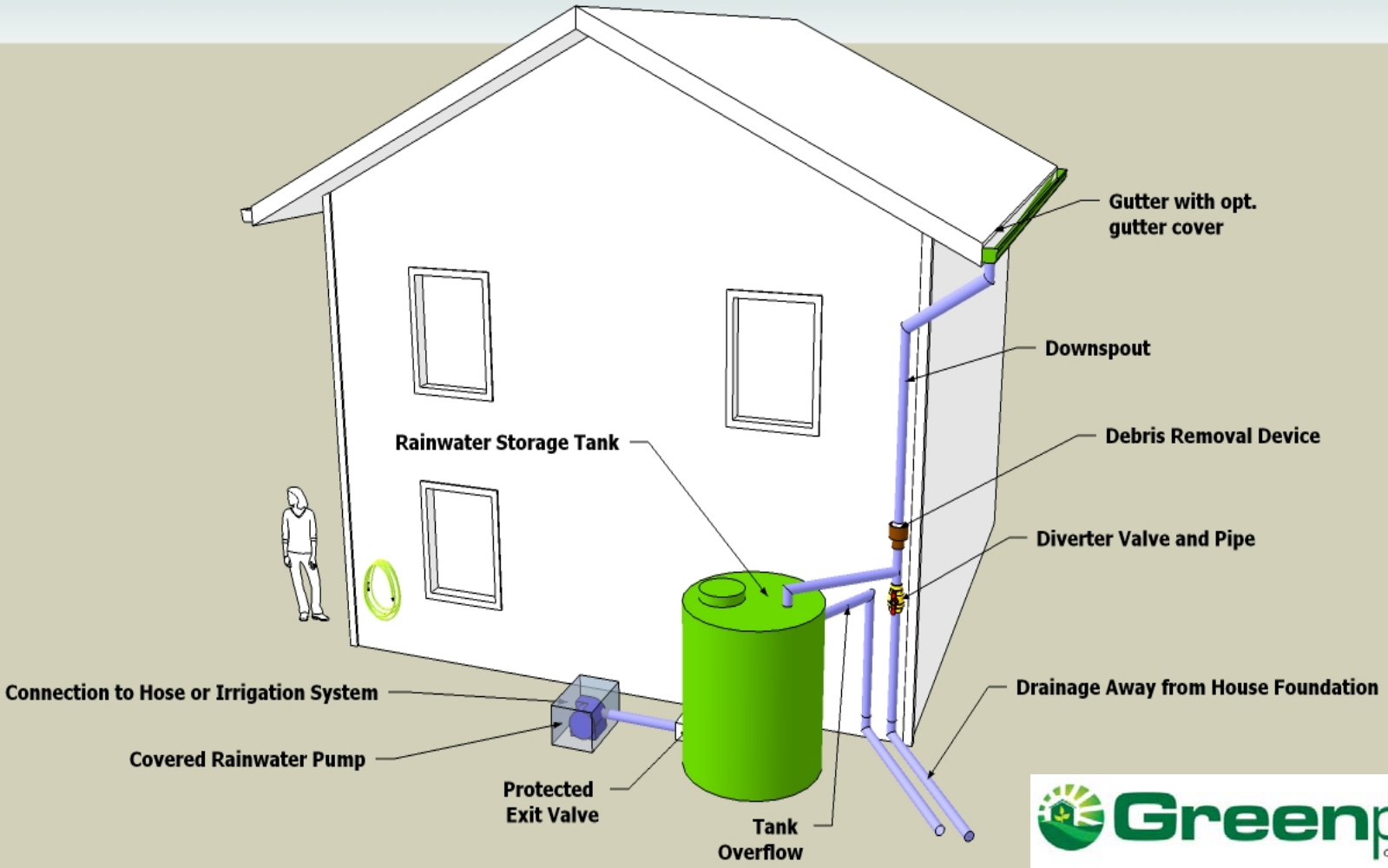
Adding Well Water to Your Tank Without Adding to Peak Hour Demand

- **Double or triple your outdoor water supply by topping up your tank at night**
- **Add 100-200 gallons during the night (timer or slow drip)**
- **Reduces the "stress" on your well OR eliminates your peak hour demand**
- **Garden water quality improves in the tank (vents gasses & warms up)**

Backflow Protection Devices are Required
Typical Air Gap Device
for “Topping up” a Tank



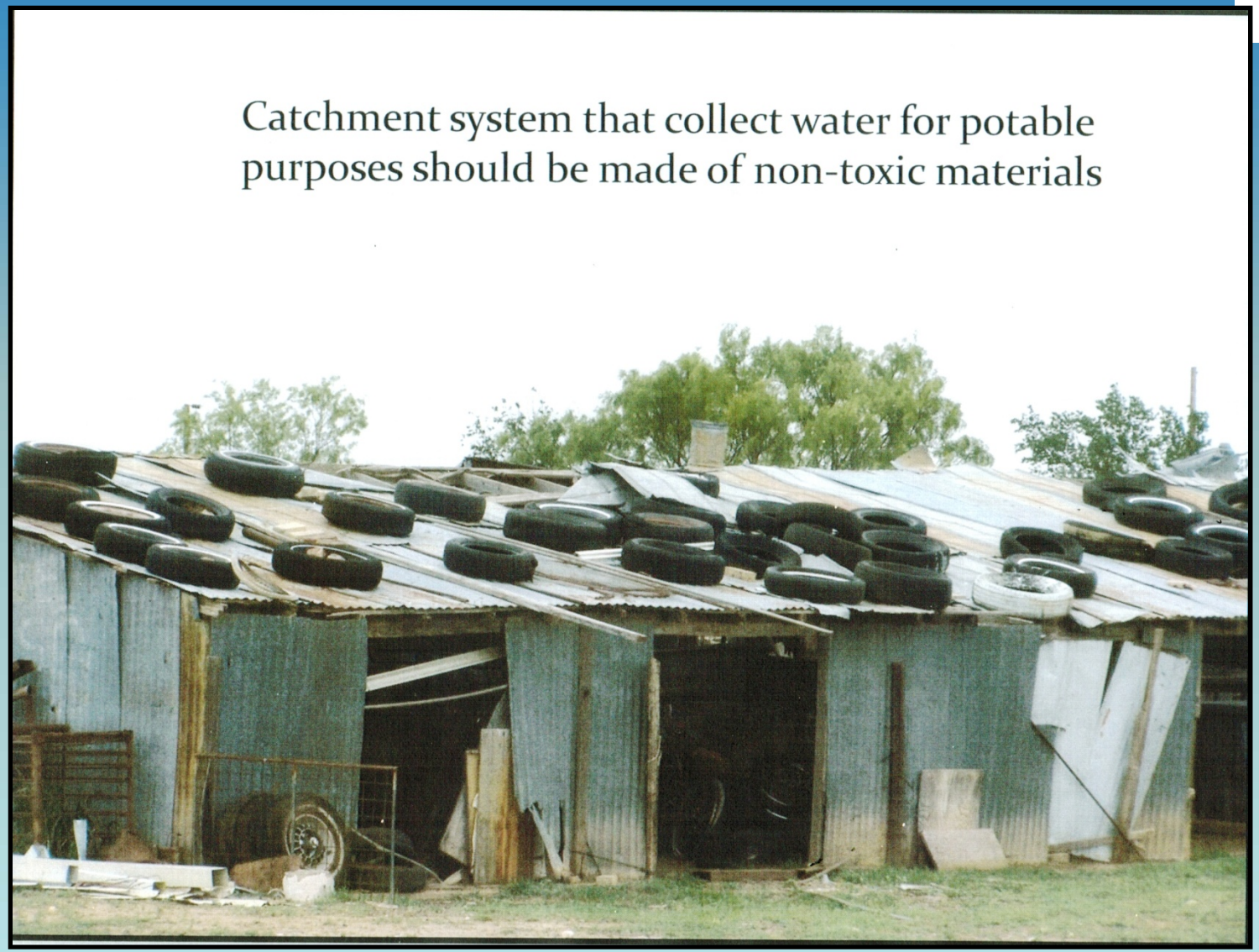
The Important Features
Non Potable (Outdoor) RWH System



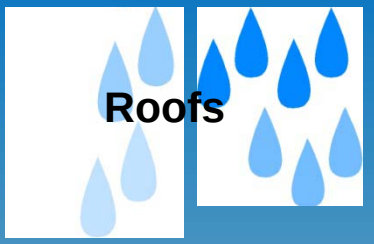
Courtesy of RDN Sustainability Dept.“Rainwater Guidebook”

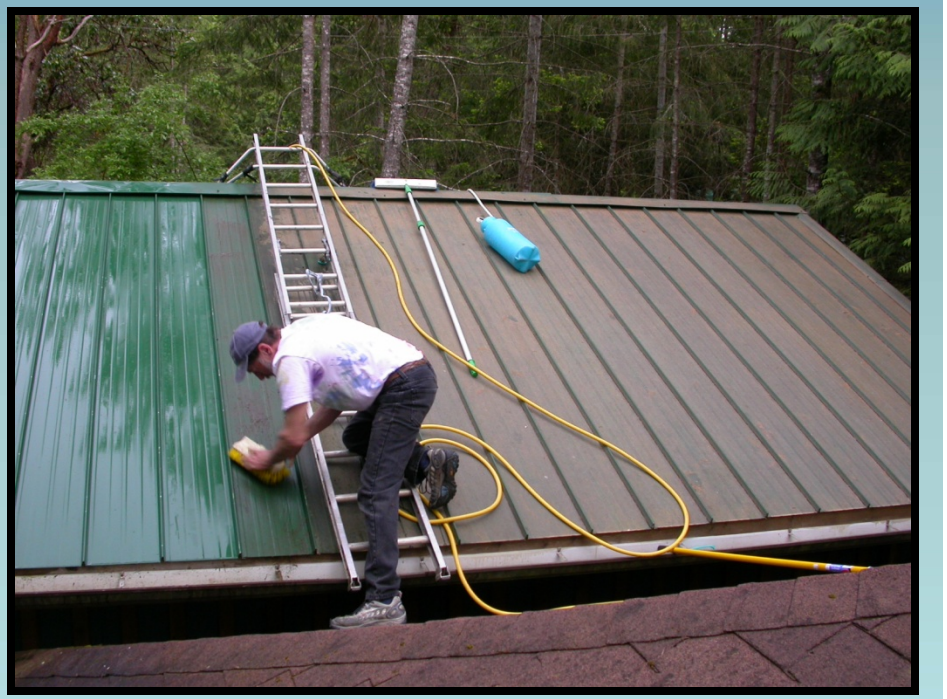
Roofs

Catchment system that collect water for potable purposes should be made of non-toxic materials



Roofs





Metal is best for collecting and easiest to clean

Unless you let 4 years of pollen build up

Roofs

Slate tiles are excellent, but expensive

Asphalt or Fibreglass shingles contain fungicides, and are harder to keep clean

Gutters Covers with screen mesh

Catchment System Components

Sentry One

Spring pollen on Gutterglove

Inspection Panels

Diverters at Valleys

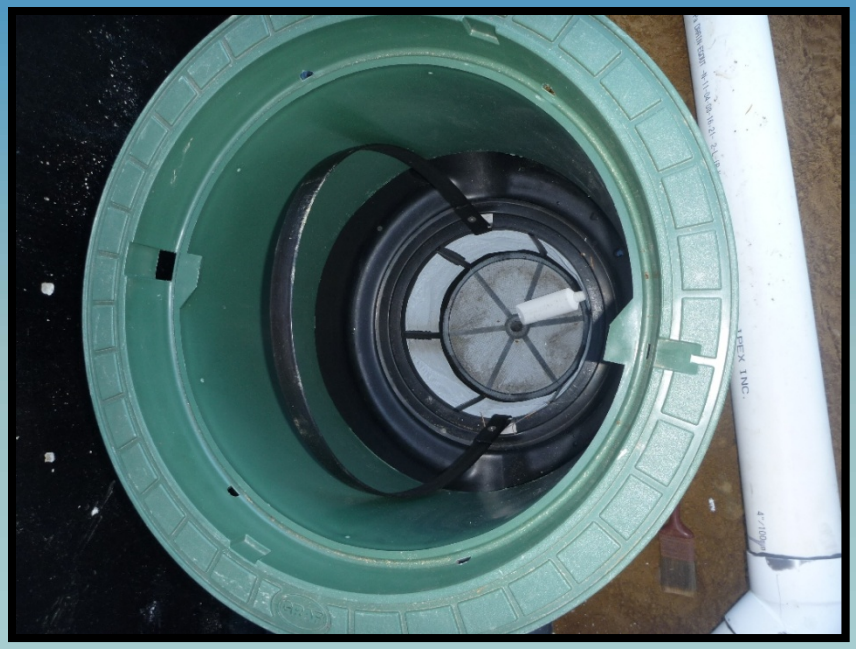
Wall Mounted Debris Traps

Can clean water from 1,400 SF (130m^2) roof catchment areas

All in One Debris Boxes clean water in two ways

Whole House Gravity Filters

Graf Basket Style Filters
Clean water from 3,770SF (350m^2).
roof to 350 Microns (100% capture)

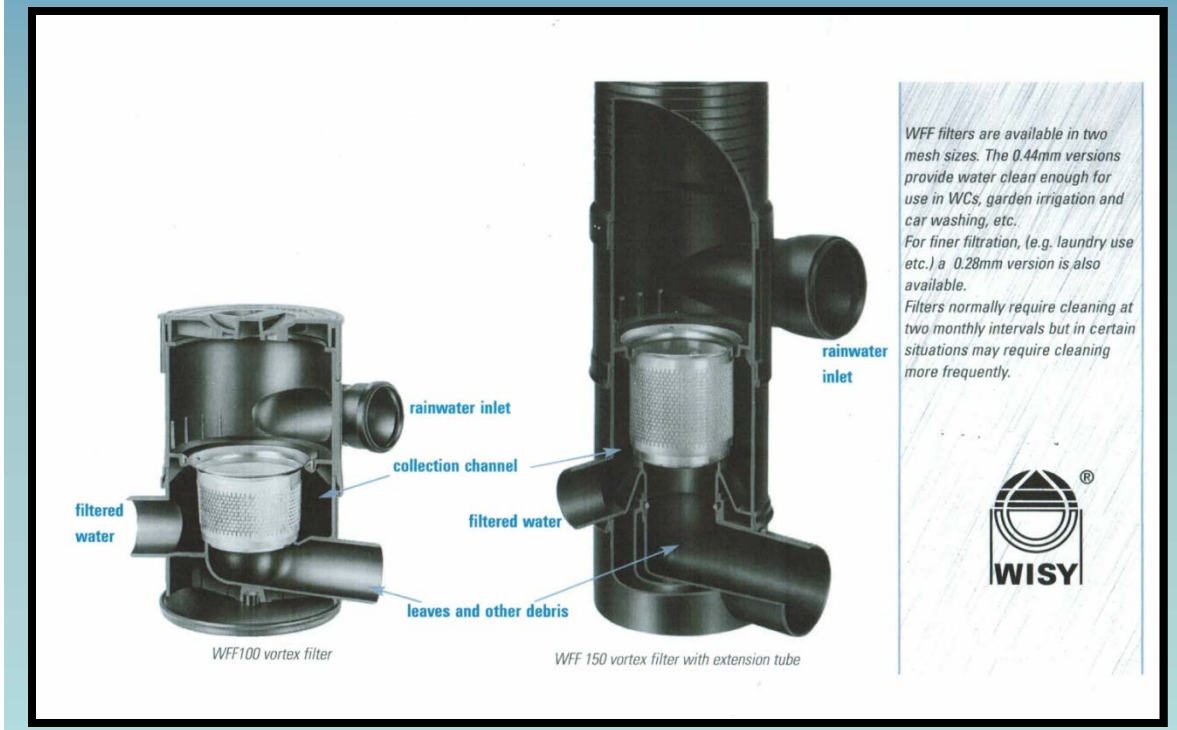


Empty and clean basket once per month

Whole House Debris Removal Devices

WISY Vortex Style Filters

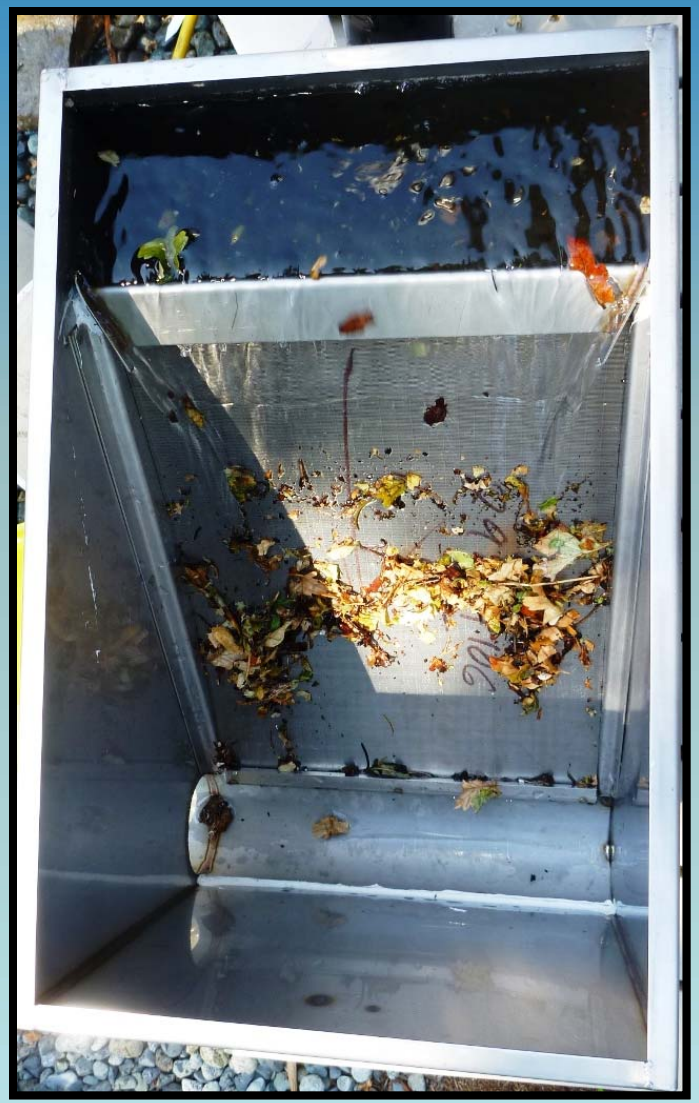
Cleans water from 4,500 sq. ft. Roof to 500 Microns (90% capture)



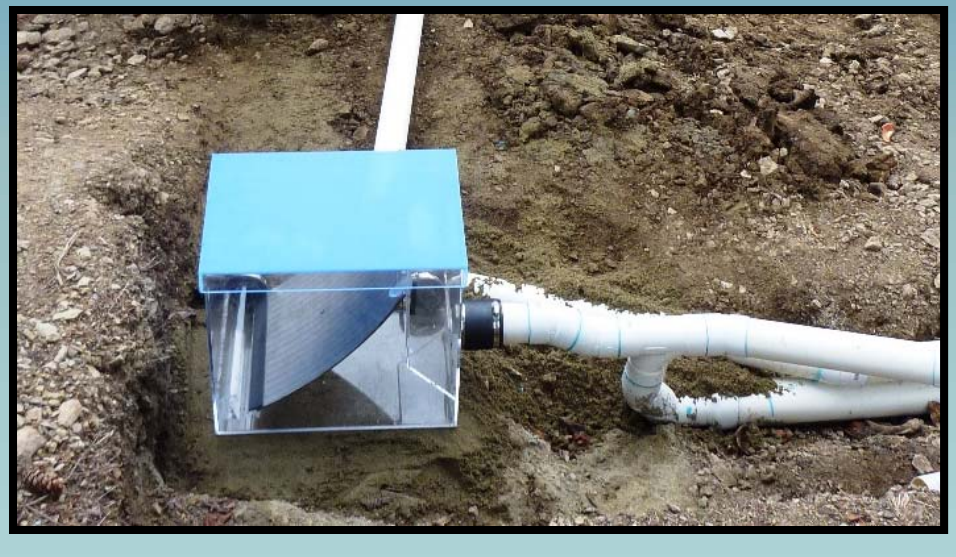
Clean SS strainer every two months

Whole House Gravity Filters

Rainwater Connection Clean Water Box™



Almost no pre-cleaning required

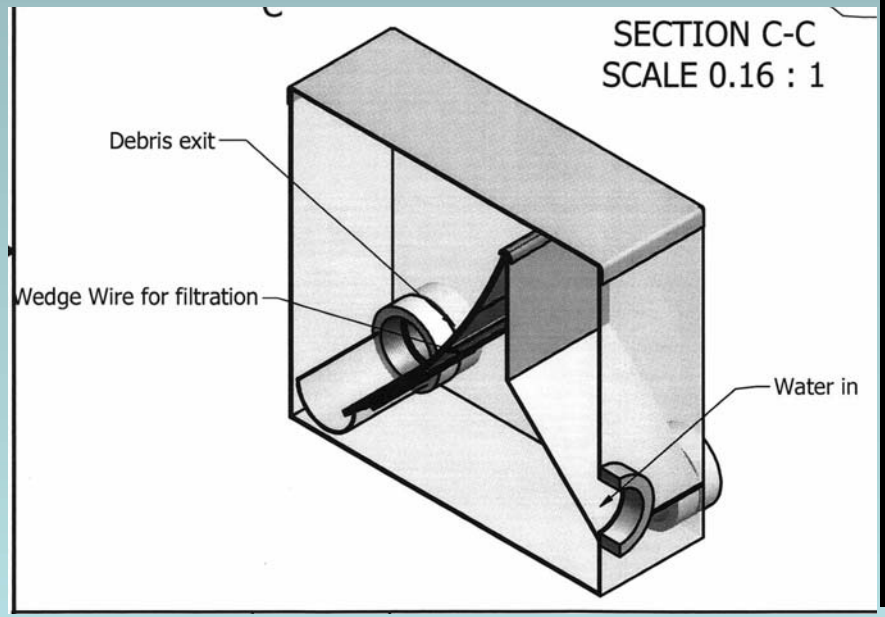


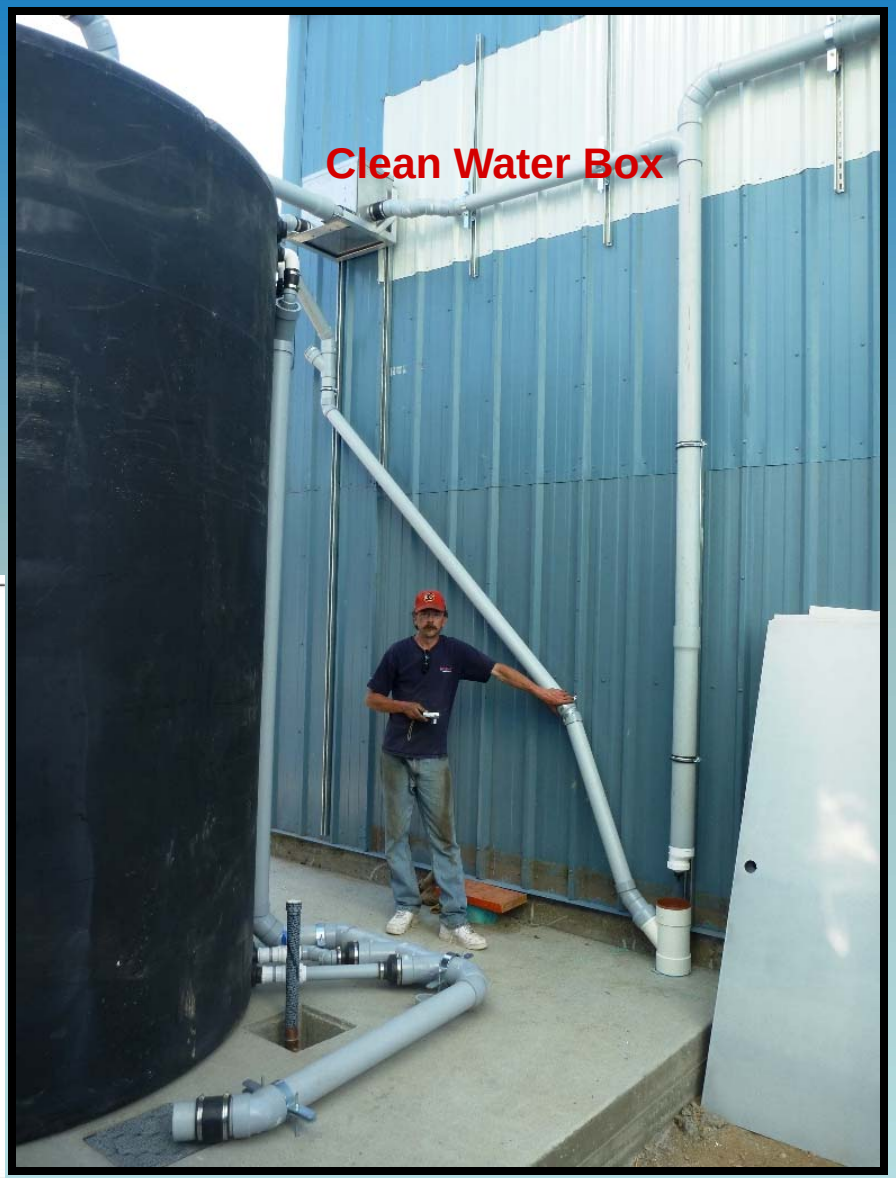
Cleans water from 5,000 sq. ft.(465m^2) of roof to 250 microns

Whole House Gravity Filters

Clean Water Box™ at Parksville Transfer Station

6,500 SF roof area supplies 18,900L (4,165 gal) tank for outdoor washing.

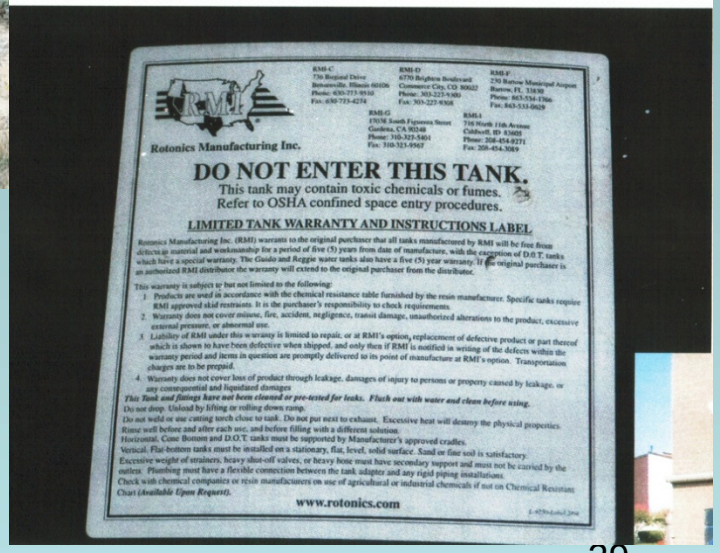





The Sheddies
THE GREEN ONE IS RAINWATER. THE OTHER TWO ARE DRAUGHT AND LAGER.
SLANE
CO.NZ

Be careful!!!

Confined Space Warning/Protection



Types of Storage

Above Ground Poly Tanks

Water Storage

Premier 1200 and

3,300 gal tanks

Premier 1660 set
14” into ground

Types of Storage

Above Ground Poly Tanks

Water Storage

200, 125, and 500 gal Leg Tanks

Premier Box Tank
400 in foreground

Types of Storage

Above Ground Poly Tanks

Water Storage

3 Premier 2500's

NOTE: Seismic restraint may be required in some locations.

"Tank Farm" of 4 Century tanks of 2,400 gal.

Polyethylene Semi Burial Tanks

Water Storage

Rectangular, Semi Burial Can West Tanks work well in crawl spaces

Semi Burial - CONTINUED

Case Example

Or semi buried in
2 ft. deep hole with soil
mounded up over

Tanks	$7,000
Installation	$3,800
Water Lines	$700

Pre-cast Concrete Tanks

Water Storage

Four 2,800 gal Pre-cast Tanks $3,100 each plus transport, plus excavation, plus interconnect piping, plus backfill pee gravel for wet sites

Steel Cisterns

Corrugated Steel Tank with Polypropylene Liner

Water Storage

16,000 gal.
behind trellis

$2.30 - $2.80 per gallon

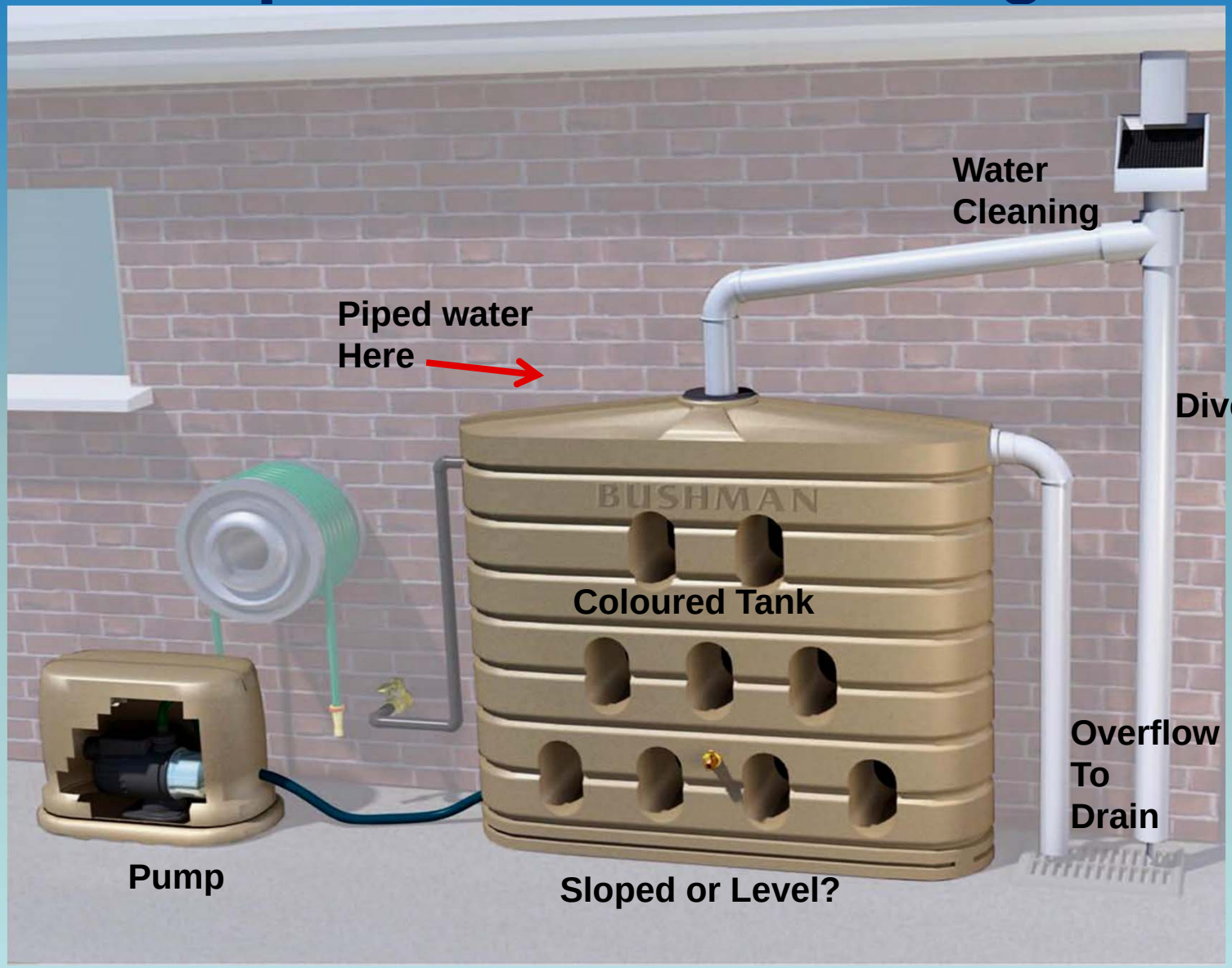
12,000 gal.
in woods

Steel Cistern

System Components

12,000 imp. gal (55m^3)

Important Features…again



CASE EXAMPLES

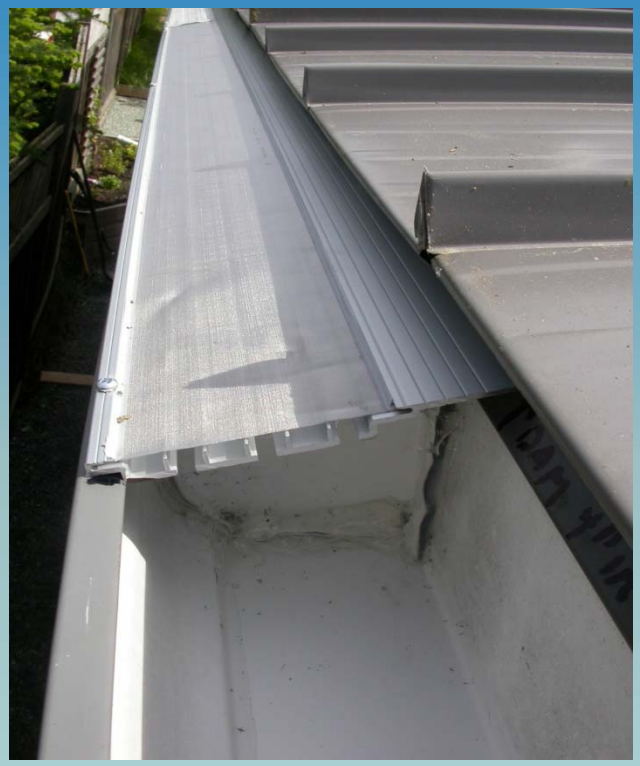
- System Features
- Installation Costs

GOOD DESIGN + MAINTENANCE = GOOD QUALITY WATER

RDN Church Road Transfer Station Administration Building

First class rainwater catchment system, and 2,346L (516 gal) slimline tank to water green roof. Piped water fill option.

Mayne Island Subdivision Home



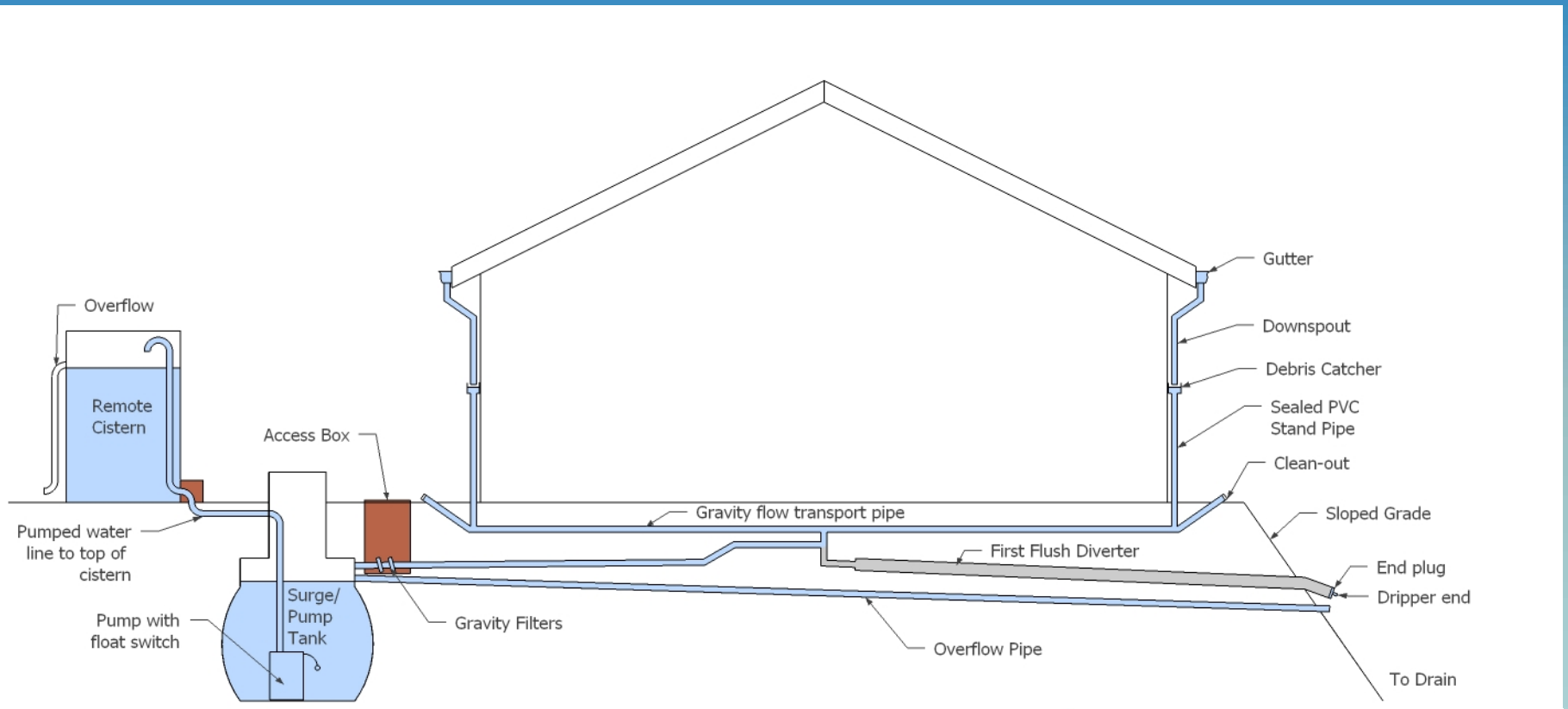
Gutter Dam and “Gutter Glove” direct to flushing/Diverter valve, and across to the fence.

Mayne Island Subdivision Home - Continued

Along the Fence and into the 1,500 gal (6,800 litre) Can West semi burial tank and Grundfos MQ3 pump

Gutter Guard	**$650**
Catchment	**$1,250**
Cistern	**$1,850**
Tank Fittings	**$900**
Pump	**$900**
TOTAL	**$5,550**

Pumping the Water to the Cistern



Greenplan designing with nature

Courtesy of RDN Sustainability Dept.
"Rainwater Guidebook"

Whole House Gravity Filter with Pump Chamber

Filtrific Basket Filter & Pump Chamber

Cleans water from 2,700 sq. ft.
to 200 microns (100% capture)

Empty and clean basket strainer every month

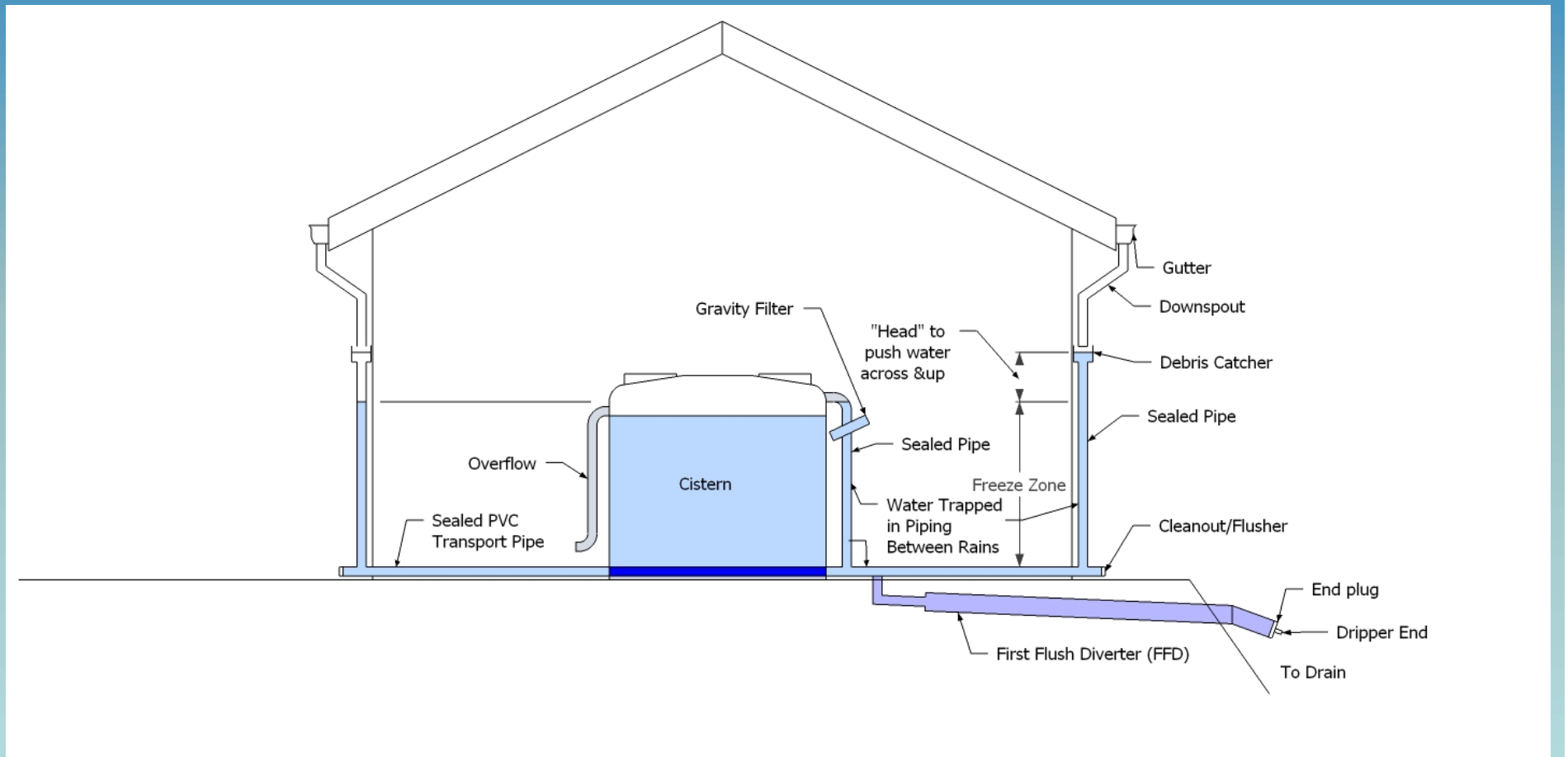
Dual Pumping Garden Water System

Salt Spring Island

Rainwater pumped from big rain barrel to two 1,250 gallon poly tanks – with on-demand pressure pump to garden

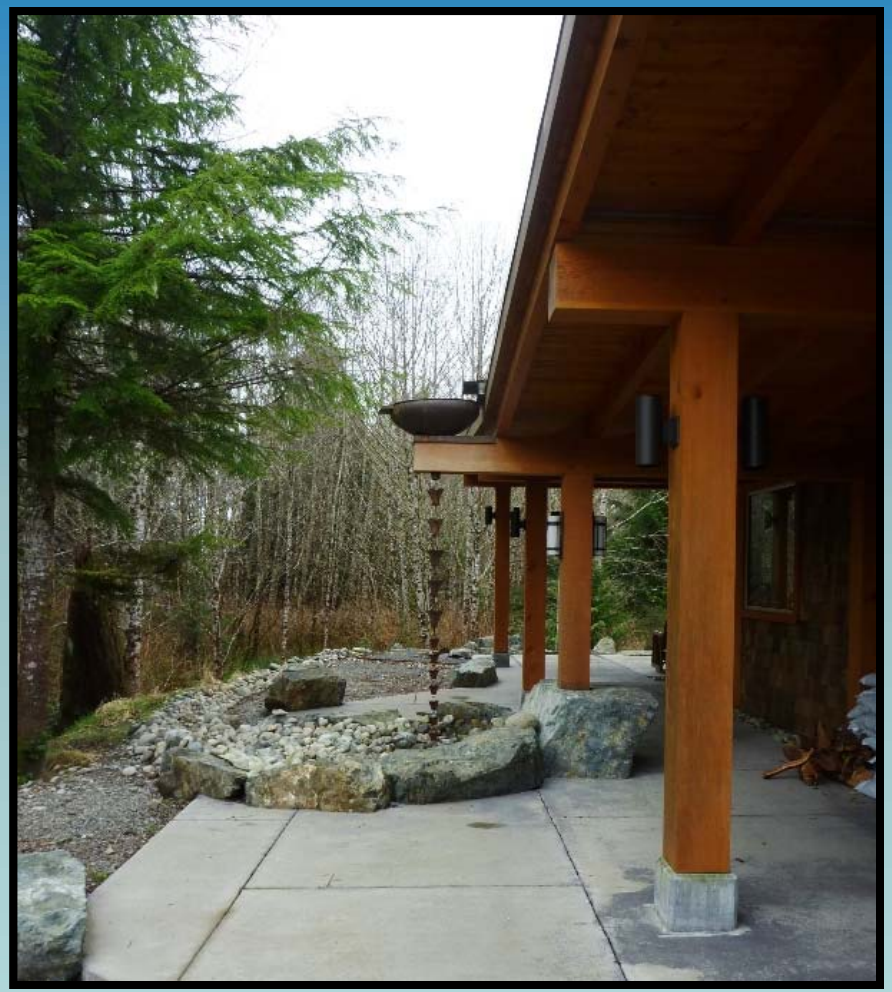
Catchment: $1,600
Tanks: $2,000
Pump: $800
$4,400 (2005)

Avoid “Wet” Systems



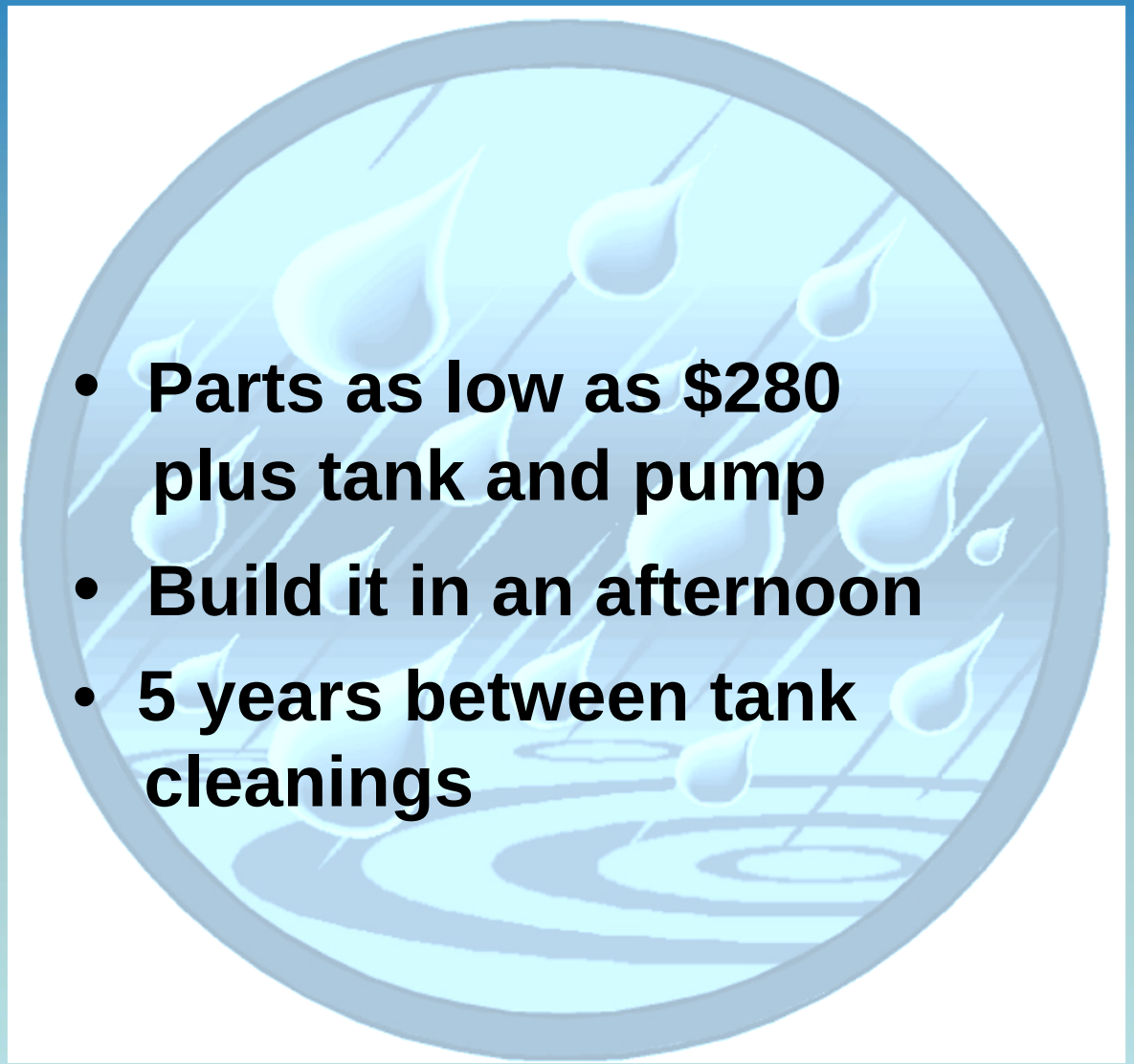
Rainwater as Part of the Landscaping

Tofino, BC



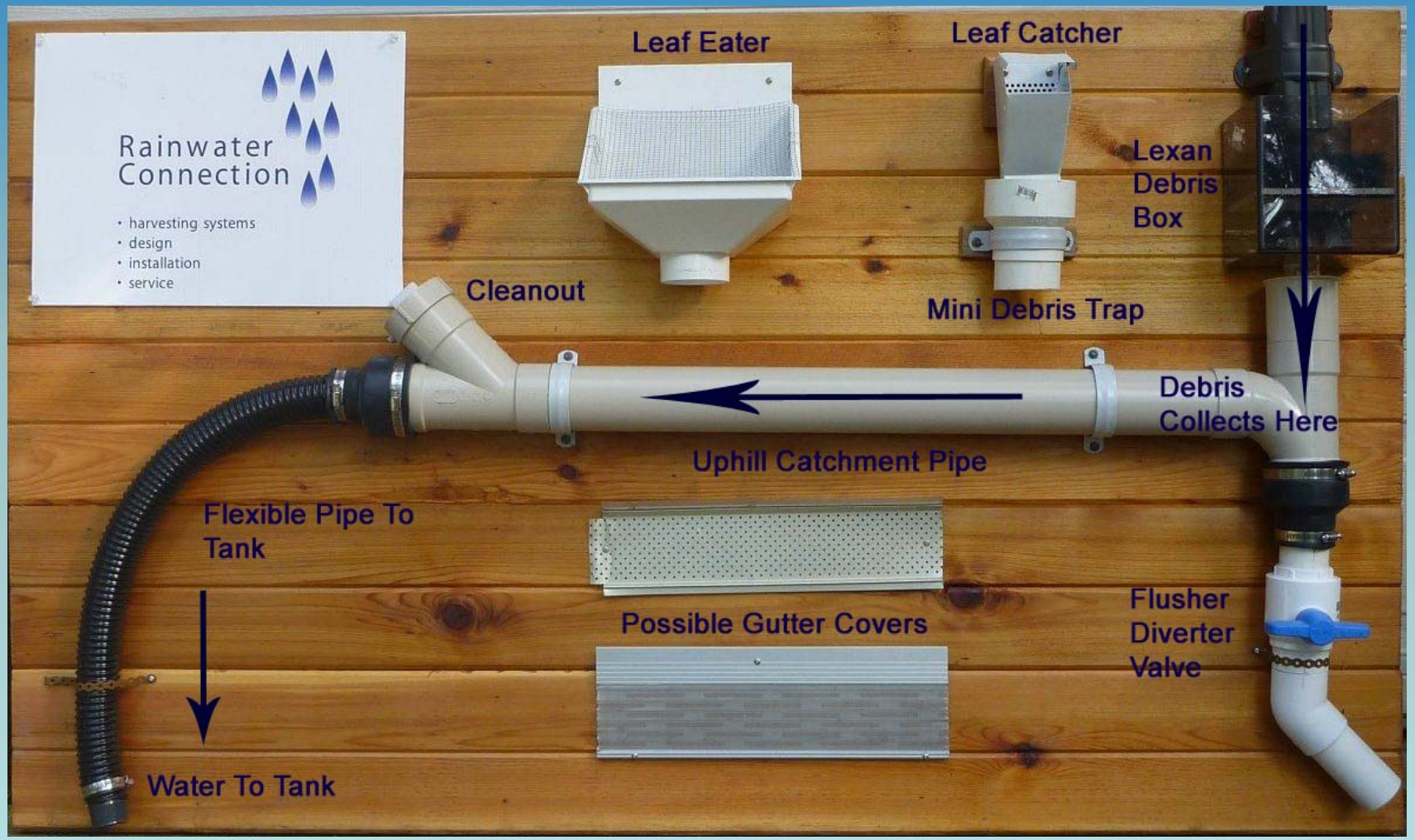
Rain chain to “streambed”. Hidden filter box & underground pipe to tank in crawl space.

TRY THIS ONE AT HOME



- **Parts as low as $280 plus tank and pump**
- **Build it in an afternoon**
- **5 years between tank cleanings**

Up Hill Pipe Rainwater Cleaning System with options



Simple Garden Water System

Thetis Island

2160 gallons (9,800 Litres) storage from Shed Roof of 145 SF or 13m^2

Gravity flow to garden

Premier 1200 &

Premier 960 Tanks (tops at same level)

$2,300

Thetis Garden System

Leaf trap, uphill sloped pipe & Diverter

Parts: $140 plus 3 hrs Labour

Tank Fittings:

- **Overflow**
- **Valved Connecting Manifold pipe**
- **Emerg Water Exit / Drain**
- **Sight Tube**

$800 (parts & labour)

Galiano Island Garden Water

Gardening Water from ½ garage to two 7.5m^3 tanks

Tanks (1,660 gal) $2,300
Tank fittings: $470
Catchment Parts: $260
Pump: $680
TOTAL PARTS: $3,710

Simple diverter/flusher and uphill pipe to lined tank basket

Design $255
Install Labour (15 hours) $950
TOTAL PROJECT COST $4,915

The Galiano Island “Tuffy” Liner

Cleans to 200 microns
Lasts 3-4 months
$12.00 each

Sooke Industrial Indoor Water

Indoor Water from ¼ of Roof for 5 employees

Two 1200 gal (5.5m^3) tanks

Open Gutters; Leaf Eater Debris Trap, and uphill pipe to tuffy liner in tank basket. First Flush Diverter (FFD) , tank manifold, and water lines to pump and filters inside.

Sooke Industrial Indoor Water System

(April 2013 pricing)

Tanks (1,200 gal)	$1,920
Tank fittings	$580
&Heat trace	$230
Catchment Parts	$810
Pump & Filters	$1,190
TOTAL PARTS:	**$4,730**
Design & Permits	$1,280
Install Labour	$3,040
OP&M Manual	$400

TOTAL PROJECT COST

$9,450

Potable Water RWH Systems

- Larger roof requirement
- Larger cistern needed
- Operate year round
- Require water disinfection
- Higher installation costs
- Increased maintenance

GOOD DESIGN + MAINTENANCE = GOOD QUALITY WATER

INDOOR water Min roof and cistern May 2013.xls
Monthly Water Balance Table

Location	St Mary's Lake Rain Stats (1981-2006)	Collection Area #1 (sqft)	1,500
Property	Typical Location north of Ganges	Collection Area #2 (sqft)	0
		Collection Area #3 (sqft)	0
		TOTAL Collection Area	1500
			139 m2
Scenario	INDOOR Use for 2 persons @30 G/P/D (136L) Steel roof in clear site accounting for pollen season shut down.	Volume Units	gal
			Choose one of gal or litre
Max Storage Cap (gal)	8,300 37.7m3		

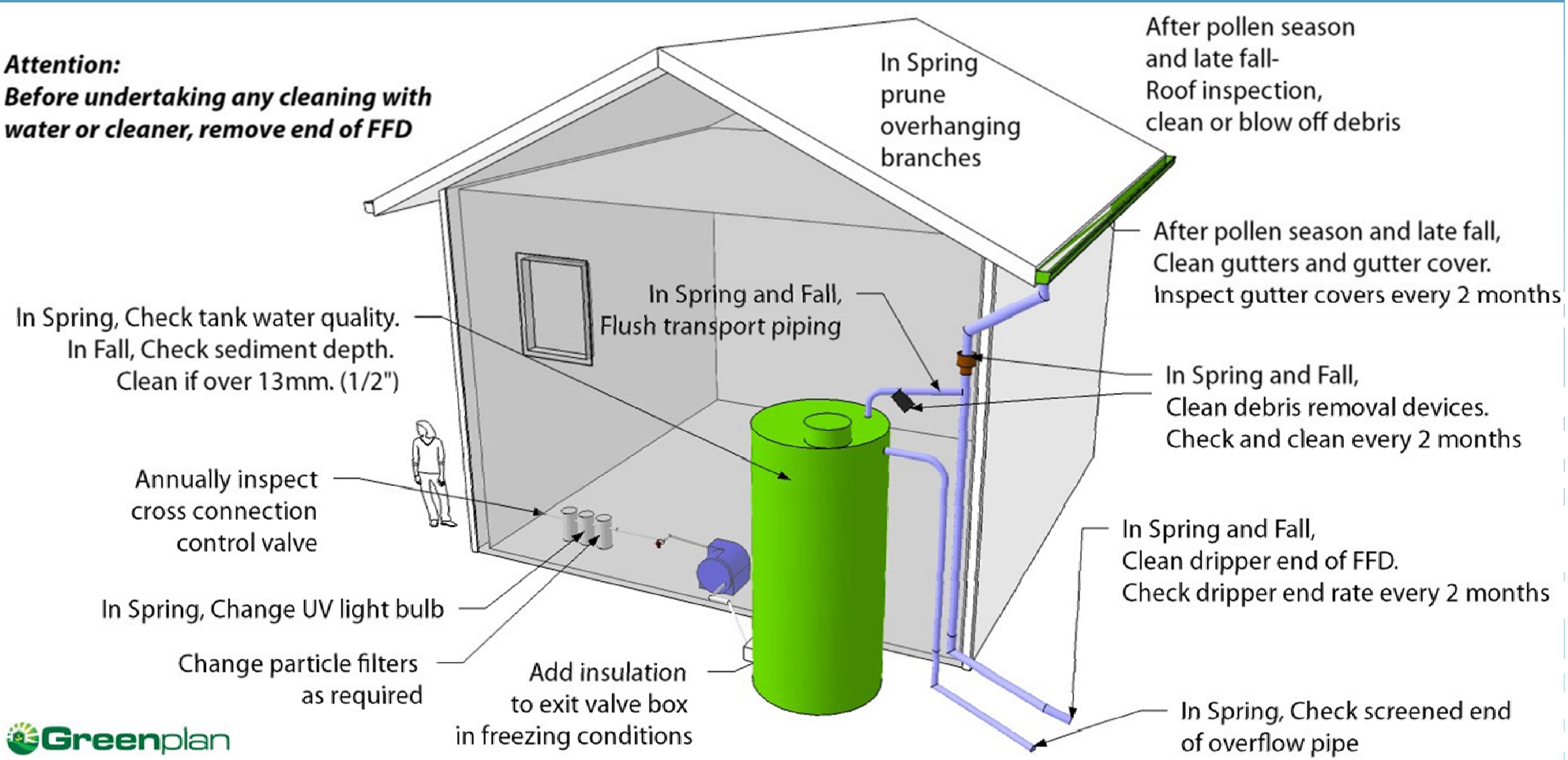
Assumed Rainfall Level: Avg

Enter 10% : 20% : 30%: 50%: Max : Avg :Min

Month	Indoor Useage gal/mon	Outdoor Useage gal/mon	Assumed Rainfall inches	Assumed Collection Efficiency	Rainfall Collected gal/mon	Alternate Supply gal/mon	Storage Volume gal/mon
Start							100
October	1830	0	3.7	75%	2164	0	434
November	1830	0	6.6	85%	4380	0	2984
December	1830	0	6.0	85%	3965	0	5119
January	1830	0	6.4	85%	4225	0	7514
February	1830	0	3.9	85%	2587	0	8271
March	1830	0	3.5	65%	1768	0	8209
April	1830	0	2.2	50%	871	0	7250
May	1830	0	1.7	75%	990	0	6410
June	1830	0	1.5	75%	862	0	5442
July	2130	0	0.9	65%	462	0	3774
August	2130	0	1.1	65%	583	0	2226
September	1830	0	1.3	75%	763	0	1160
TOTAL	22,560	0	38.8		23,620	0	1,060
Demand	22,560			Supply	23,620		Surplus Supply

2 Person Conserver Household using 30 gal (136L) per person per day needs a minimum 1,500 SF (139m^2) roof area and 8,300 gal (37.7m^3) cistern

Potable Water RWH System Maintenance



GOOD DESIGN + MAINTENANCE = GOOD QUALITY WATER