



Planning and Development Department
Energy and Sustainable Development &
Building and Safety Division

07/12/10 (Revised to update code references 12/21/10)

Guidelines for Rainwater Harvesting

This document provides guidelines, sets standards and outlines procedures for rainwater harvesting and the subsequent use of rainwater. Systems are divided into two types:

1. No permit required: Rain barrel systems using collection vessels of 100 gallons and less, meeting requirements for rain barrels (see page 2), do not require permits.
2. Permit required:
 - a. Rain barrel systems not meeting the requirements of the 'no permit' systems; and
 - b. Rain catchment systems using vessels greater than 100 gallons require permits.

In order to facilitate rain water harvesting while protecting the public health and safety, city agencies have researched potential detriments and have determined that small scale rain water harvesting systems or rainbarrels, as defined in these guidelines can be safely installed and utilized without further oversight from city staff provided such systems are regularly maintained and meet the standards in this document. All other systems will require plans and permits and are subject to the standards set forth in this document.

Definitions:

Cistern: The central storage component of the rainwater harvesting system or any storage vessel greater than 100 gallons.

Downspout: The rain leader from the roof gutter to the rainwater storage vessel or other approved location as provided in the 2010 California Plumbing Code (CPC) Section 1101.1.or current edition of the CPC.

Rain barrels: Storage vessels 100 gallons or less capturing flow directly from the down spout.

No-Permit Systems

No permit or city approval is needed for rain barrel systems of 100 gallons or less per vessel, provided the following requirements are met:

Note: Rain catchment systems over 100 gallons or over 100 gallons in aggregate per downspout will be considered cisterns subject to the permitting and requirements for treatment as such.

Requirements:

1. Rain barrels shall be sited at grade on a sound and level surface at or near gutter downspouts.
2. Water collected shall used for irrigation only.
3. Rain barrel openings shall be screened with a corrosion resistant metallic fine mesh (.05 inch x .05 inch) to prevent mosquitoes from entering.
4. Gutters serving rain barrels shall be screened with an approved leaf guard or maximum ½” to ¼” minimum corrosion resistant metallic hardware fabric
5. Large openings in the barrels shall be securely fastened to prevent accidental drowning.
6. No pumps, connections to domestic water or interior use are permitted.
7. Rain barrels shall be located a minimum of 3 feet from the property line.
8. Overflow or discharge from rain barrels may not discharge across the public right-of-way or onto adjacent property, or in any way create a nuisance as per 2010 CPC Section 1101.1.or current edition of the CPC.
9. Collection vessel(s) for each existing downspout shall not exceed 100 gallons in the aggregate for each downspout.
10. Rain barrels and gutters shall be cleaned annually.
11. Rainwater from no-permit systems is not required to be treated prior to use
12. The system shall be used and maintained in a manner that does not cause a public nuisance and may be subject to inspection and/or enforcement action as a result of a complaint.

2010 California Building Code (CBC) Chapter 1 as adopted by the Berkeley Municipal Code Title 19.28.020; Section 105.2- Work exempt from permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction.

Permitted Systems

No rainwater catchment system in excess of 100 gallons shall be installed without permits (see table on page 5) and approval from the City of Berkeley building department and other local authorities having jurisdiction.

Application Requirements:

Document submittals:

1. Site plan
2. Plumbing drawings
3. Request for Alternate Materials or Methods of Construction (AMMR)
4. Special inspection agreement
5. Proof of notification to the Back flow division of East Bay Utilities District (EBMUD)

Site plan: It is recommended that drawings be 18” x 24” minimum size, but 11” x 17” may be used if clarity is maintained.

Site plan shall be drawn to scale and completely dimensioned showing lot lines public right of way, structures, directions and approximate slope of surface, location of all present or proposed retaining walls, drainage channels, water supply lines, wells, paved areas and structures on the plot and the location of the collection and distribution system.

Plumbing drawings: Plumbing drawings shall include a complete description of the installation, construction and materials, flow direction, equipment specifications and listed use.

AMMR: Any permit application for a rainwater catchment system must be accompanied by a formal Request for Alternate Materials or Methods of Construction or AMMR. The form is available at the counter of the Permit Service Center or on-line at <http://www.ci.berkeley.ca.us>. Select: "Online Service Center" then "Download forms from the Planning Department" then "Building & Safety", then "Application for Alternate Materials or Methods of Construction" .Or go to: http://www.cityofberkeley.info/uploadedFiles/Online_Service_Center/Planning/ApplicationorAlternateMaterialormethodsofconstruction.pdf

The request must be filled out as follows:

Subject of alternative	Use of rainwater for irrigation, subsurface	Use of rainwater for irrigation, above surface	Use of rainwater for interior nonpotable use
Code requirement	Chapter 16a Graywater to be used for subsurface irrigation. (For Commercial, use Appendix G)	1) 2010 CPC Chapter 6, Sec 601.1 reclaimed water and treated graywater use for non potable purposes. 2) Reclaimed water shall be treated to standards required in EPA document 625-R-041-108	3) 2010 CPC Chapter 6, Sec 601.1 reclaimed water and treated graywater use for non potable purposes. 1) Reclaimed water shall be treated to standards required in EPA document 625-R-041-108
Alternate Proposal	To use untreated rainwater for subsurface irrigation	To use treated rainwater for above ground exterior use treated to the standards of EPA Document 833-F-08-010 as recommended for indoor use.	To use treated rainwater for interior nonpotable use for toilet flushing and or laundry treated to the standards of EPA Document 833-F-08-010 as recommended for indoor use.
Justification	After the initial runoff is diverted, stored rainwater has better water quality than graywater	EPA 625-R-041-108 is for the municipal treatment of waste water, and does not allow for single family use of reclaimed water. EPA 833-F-08-010 deals specifically with rainwater for use in all occupancies	EPA 625-R-041-108 is for the municipal treatment of waste water, and does not allow for single family use of reclaimed water. EPA 833-F-08-010 deals specifically with rainwater for use in all occupancies

Any system other than the examples cited on the previous page will be subject to a more intensive plan review by Building and Safety and Environmental health, and additional time may be needed.

Special Inspection Agreement: A Special Inspection Agreement will be needed for the following:

1. 3rd party inspection of a cross connection test as described in the 2010 CPC Chapter 16A Part II, 1620A Inspection and Testing.
2. As required for anchoring of a cistern by the design professional when so designated by the registered design professional in responsible charge of the design.

Proof of notification: Eastbay Municipal Utilities District Back-flow Division needs to be notified when any alternate plumbing system is installed. They are to be notified by phone by the account holder. After you have called EBMUD to tell them of your planned alternate plumbing installation, provide your Email to them and ask them send you an email acknowledging the notification. This is your proof of notification.

To contact the Back Flow Division call: (510) 287-0874)

System requirements:

- ARCSA/ASPE Rainwater Catchment Design and Installation Standards * hereafter referred to as the ARCSA / ASPE standards, will be used for the design and installation. *For back ground on standard see page 7
- Cross connections to the potable water system is not permitted. Either an air gap of 1½" or an approved reverse principal backflow devise (RPBD) is required for potable water backup. If a RPBD is used, East Bay Municipal Utility District (EBMUD) and Environmental Health Department approval of the device is needed. As these devices require annual maintenance, proof of an annual inspection service contract is required at time of permit application.
- Buildings with both potable and nonpotable systems shall follow the requirements prescribed in Chapter 6 of the current edition of the CPC for pipe identification and water outlet labeling.
- Any dual plumbed system will be required to undergo and pass a cross connection test as described in Chapter 16A Part II, 1620A Inspection and Testing if piping for nonpotable water is to be installed within a building. Third party verification will be required and submitted to the Building and Safety Division prior to sign off of the plumbing permit.

Allowable Uses:

- Subsurface irrigation
- Exterior nonpotable uses , including above surface irrigation (subject to Environmental Health review)
- Interior nonpotable uses, includes toilet flushing and laundry (subject to Environmental Health review)

Environmental Health, a division of the City of Berkeley Public Health Department can be contacted at 981- 5310 or envhealth@ci.berkeley.ca.us

Environmental Health Requirements:

COB. Minimum Water Quality Guidelines and Treatment Options for Rainwater Reuse.

Use	Minimum Water Quality Guidelines	Required treatment options
Non-potable indoor uses: toilet flushing, laundry	Total coliforms < 500cfu per 100mL Fecal coliforms < 100cfu per 100mL	Prefiltration-firstflush diverter and Cartridge filtration- 5 Micron sediment filter and Disinfection- chlorination with household bleach or UV disinfection
Non-potable outdoor use: Sprinklers, HVAC, carwashing**	Total coliforms < 500cfu per 100mL Fecal coliforms < 100cfu per 100mL	Prefiltration-firstflush diverter and Cartridge filtration- 5 Micron sediment filter and Disinfection- chlorination with household bleach or UV disinfection
Outdoor uses: sub-surface irrigation	no treatment required	Filter as required for use per manufactures equipment specifications
Rainbarrels under 100 gal	no treatment required	

**The Table above has been reviewed and accepted by the Environmental Health Division of the City of Berkeley Public Health Department for rainwater use in Berkeley.*

***Residential Best Management Practices encourage minimizing flow to the storm drain by washing cars over permeable surfaces such as a lawn.*

System Designer Requirements*: Rainwater Catchment systems complying with this provision shall be designed by a person registered or licensed to perform plumbing design work. All components, piping and fittings used in rainwater collection shall be listed.

Exceptions:

1. A person registered or licensed to perform plumbing design work is not required to design rainwater catchment systems used for irrigation with a maximum storage capacity of 360 gallons
2. A person registered or licensed to perform plumbing design work is not required to design rainwater catchment systems for single family dwellings where all outlet, piping and system components are located on the exterior of the building.

*Chapter 5 IAPMO Green Plumbing and Mechanical Code Supplement (see ref.6 on page 9)

Permitting requirements:

Permitting requirements are as follows:

System	Plumbing permit	Electric permit	Building permit
<i>Cisterns at grade ≤360 gallons</i>	x		
<i>Cisterns at grade >360 gallons*</i>	x		
<i>Cisterns >5000 gal and >2:1 ht to w*</i>	x		x
<i>Cisterns above grade (raised)*</i>	x		x
<i>Cisterns below grade*</i>	x		x
<i>Cisterns within a building*</i>	x		
<i>Pumps added to any system</i>		x	

**Engineered drawings and calculations may be needed for anchoring of cisterns, seismic loading, anticipated loading, depending on location, seismic design category and size of cistern on a case by case basis.*

Land use (zoning) requirements:

No zoning approval is needed for underground cisterns. Cisterns on or above grade require a zoning certificate.

Land use planning can be contacted at (510) 981-7410 or planning@cityofberkeley.info

Structural requirements:

1. All tanks shall be anchored per manufactures specifications. Tanks over 360 gallons shall have designed anchorage.
2. Underground cisterns shall be structurally designed to withstand all anticipated earth or other loads. All holding tank covers shall be capable of supporting a load of 300 psf. Tanks shall be ballasted or anchored or otherwise secured against buoyancy.
3. Tanks raised above grade or within a building shall have engineered support and anchoring systems appropriate for the seismic design category.

Maintenance Responsibility:

The required maintenance and inspection of rainwater collection systems shall be the responsibility of the property owner unless otherwise required by the City of Berkeley.

Maintenance:

Rainwater systems and components shall be inspected and maintained in accordance with the following table unless more frequent inspection and maintenance is required by the manufacturer.

Maintenance Log and Schedule: A maintenance log and schedule of maintenance shall be posted at the equipment and a copy shall be included in the plans for review. The property owner or designated appointee shall ensure that a record of testing, inspection and maintenance as required by the following table is maintained in the log. The log will indicate the frequency of inspections and maintenance of each system.

Operation and Maintenance Manual:

An operation and maintenance manual shall be supplied to the building owner by the system designer prior to final inspection. The operation and maintenance manual shall include the following:

1. Detailed diagram of the entire system and the location of all system components
2. Instruction on operating and maintaining the system
3. Details on maintaining the required water quality
4. Details on deactivating the system for maintenance, repair or other purposes
5. Details on decommissioning the system
6. Applicable testing, inspection and maintenance frequencies as required by the maintenance table below
7. A method of contacting the component manufacture(s)

Minimum rainwater source testing, inspection and maintenance frequency:

Description	Minimum frequency
Inspect and clean filter and screens, and replace (if necessary)	Every 3 months
Inspect and verify that disinfection filters and water quality treatment devices and systems are operational and maintaining minimum water quality requirements as determined by Environmental Health.	In accordance with manufacture's specifications but no less than every 3 months
Inspect and clear debris from gutters, downspouts and roof washers	Every 6 months
Inspect and clear debris from roof or other above-ground collection surface	Every 6 months
Remove tree branches and vegetation overhanging roof or other above-ground collection surfaces	As needed
Inspect pumps, valves and pressure tanks and verify operation	After initial installation and every 12 months thereafter
Clear debris for and inspect cistern tanks, locking devices and verify operation	After initial installation and every 12 months thereafter
Inspect caution labels, signage and pipe marking	After initial installation and every 12 months thereafter
Cross connection test (Dual Plumbing)	After initial installation and every 12 months thereafter

Background for Standard

Rainwater barrel and catchment systems are not currently addressed in the California Codes. The provisions of the code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by the California Codes as adopted by the City of Berkeley.

When 'methods and materials' are not addressed specifically in the code, the enforcing agency is required to accept alternative proposals provided the applicant provides adequate evidence that such systems are equivalent in quality, strength, effectiveness, fire resistance durability and safety.

The methodology for submitting such information is called an Alternate Methods and Material Request, or AMMR. Rainwater catchment is not specifically prescribed by the code; therefore it is not the intention to prohibit the collection of rainwater. As the plumbing code does not define, provide or recommend standards for the use of rainwater, a recognized standard is needed to regulate the use of rainwater catchment.

Under an International Association of Plumbing and Mechanical Officials (IAPMO) proposed Green plumbing and mechanical code supplemental code Chapter 5 *Alternate Water Sources for Nonpotable Applications* for the 2012 Uniform Plumbing Code (UPC), the *Rainwater Catchment Design and Installation Standard* developed by the American Rainwater Catchment Systems Association (ARCISA) and the American Society of Plumbing Engineers (ASPE), is recognized. IAPMO is now developing code language for the 2012 UPC. The soonest this standard and the supplemental code by IAPMO would be adopted by the City of Berkeley is January 2014. Approving a standard now that is in the process of being approved will save time for applicants and plan checkers, and will provide consistency now and into the future.

Findings

This guideline is based upon the following findings:

1. In June 2008, Governor Schwarzenegger signed executive order S-06-08, an Emergency Declaration proclaiming that a state wide drought condition existed. Immediate water conservation measures were asked for within the order.
2. In February 2009 a proclamation of a state of emergency for state wide water shortage was issued by Governor Schwarzenegger.
3. A June 2009 report to the governor by the California Department of Water Resources, indicates the agency is preparing for a fourth year of drought in 2010, including long-term drought contingency planning and states that. "Sustainability—for water users and for the ecosystem—is a necessity".
4. Chapter 16 A Part 1, the new graywater code for residential was adopted California Building Standards Commission as an emergency measure on August 4th 2009 in response to the Governors Emergency Declaration.
5. Water saving strategies are being encouraged at the state and municipal level. State Senate bill 1258 and Assembly bills 300 and 1408 deal with water conservation. The East Bay Municipal Utility District offers rebates for water saving strategies
6. The 2008 California Green Building Standards Code (CGBSC Title 24 part 1 went into effect in August 2009 , voluntary standards including :
 - o Chapter 6 Water Efficiency and Conservation
 - o Wastewater reduction; Outdoor Water Use;
 - o Potable water reduction; 604.3
 - o Potable water elimination;
 - o Rainwater or stormwater collection.
7. The 2010 California Green Building Standards Code (CGBSC Title 24 part 1 going into effect January 2011 has mandatory standards including:
 - o 20% reduction of indoor water use for residential and non residential
 - o Waste water reduction in non residential new construction which encourages use of rainwater, graywater and recycled water use as an option for compliance.
8. Appendix J of the 2001 CPC allows for reclaimed or recycled water to be used for irrigation, toilet flushing and various other approved uses in non-residential applications.
9. Berkeley has little access to municipally reclaimed or recycled water, to help mitigate water shortages. High quality potable water is used for non potable

uses in the industrial, commercial and domestic sectors of the city for process, irrigation and street sweeping.

10. In 1987 Berkeley adopted the Residential Energy Conservation Ordinance (RECO) One of the findings stated “the wise and efficient use of energy and water is essential to the health, safety and welfare of the people of the City of Berkeley.”

Therefore, the Building and Safety Division of the Planning and Development Department of the City of Berkeley has written and implemented these guidelines.

References

1. *California Building Code (CBC) 2010 Chapter 1*, as adopted by the City of Berkeley effective January 1, 2011
2. *California Plumbing Code (CPC) 2010 Chapter 6*
Section 601.2 Identification of a Potable and Nonpotable Water System,
Section 603.2 Backflow Prevention Devices, Assemblies, and Methods,
Section 604.0 Materials
Section 608.2 Excessive water pressure
Section 610.13 Exceptions 6 and 7
3. *California Plumbing Code (CPC) 2010 Chapter 16A parts I and II*
4. *American Rainwater Catchment Systems Association / American Society of Plumbing Engineers (ARCSA/ASPE) Standards: Rainwater Catchment Design and Installation Standards*
5. *Environmental Protection Agency (EPA) 883-F-08-010: Municipal Handbook- Rainwater Harvesting Policies*
6. *San Francisco Memorandum of Understanding (MOU)*
7. *International Association of Plumbing and Mechanical Officials (IAPMO) Green Plumbing and Mechanical Code Supplement proposal for the 2012 UPC Chapter 5*

Approved by:

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Date

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Date

Date: July 12, 2010