



City of Carmel-by-the-Sea  
Building Safety Division  
Standard Operating Guidance

## **17-12 Non-Potable Rainwater Harvesting Systems**

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### **Background**

Rainwater harvesting systems (aka Rainwater Catchment Systems) collect precipitation from rooftops and other above-ground impervious surfaces that is stored in catchment tanks for later use. Rainwater harvesting systems can range from a simple barrel at the bottom of a downspout to multiple storage tanks with pumps and filtration. Untreated rainwater can be used to water all your outside plants, including edible ones.

The CA Plumbing Code prescribes requirements for rainwater harvesting systems ranging from stand-alone outdoor irrigation systems to systems interconnected with the buildings plumbing system to provide water for sanitation and other non-potable uses. The permitting and design requirements for interconnected systems are contained in the CA Plumbing Code. The Monterey Co. Health Department, local water purveyors, and the Monterey Peninsula Water Management District may all have additional requirements for catchment systems and catchment systems interconnected with potable water systems.

Due to the complexity of interconnected systems, this Standard Operating Guidance (SOG) is limited in scope to stand-alone outdoor irrigation systems. The SOG provides guidance on the application of code provisions to stand-alone irrigation systems. It does not provide the full text of the code, nor does it supersede the code in any way.

### **Citations**

Carmel Municipal Code 15.24  
2019 California Plumbing Code Chapter 6  
2019 California Plumbing Code Chapter 16

### **Guidance**

The California Plumbing Code (CPC) provides requirements for rainwater harvesting systems installed in the City of Carmel-by-the-Sea. It defines rainwater harvesting systems (rainwater catchment systems) as “A facility designed to capture, retain, and store rainwater flowing off a building, parking lot, or any other manmade impervious surface for subsequent onsite use”.

In addition, the CPC defines a Rainwater Storage Tank as “The central component of the rainwater catchment system, also known as a cistern or rain barrel.

### **Permit Requirements (CPC 1601.3)**

In general, a permit is required for the construction, installation, or alteration of a rainwater harvesting system (CPC 1601.3). The State of CA and City of Carmel have adopted 2 exceptions to this permitting requirement:

1. A permit is not required for exterior rainwater catchment systems used for outdoor non-spray irrigation with a maximum storage capacity of 5000 gallons where the tank is supported directly on grade, the ratio of height to diameter or width does not exceed 2 to 1, and it does not require electrical power or a connection to a potable water system.
2. A permit is not required for exterior rainwater harvesting systems used for spray irrigation with a maximum storage capacity of 360 gallons.

For systems requiring a permit, the applicant shall submit a complete plumbing permit application including plans, calculations, and specifications on the system and its components for review and approval by the Building Official. Plan review and permit fees in accordance with the Building Safety Division Fee Schedule shall be paid prior to review and issuance of an approved permit.

### **System Design (CPC 1601.2)**

Non-potable Rainwater Harvesting Systems shall be designed by a person who demonstrates competency to design the system as required by the City of Carmel and the CPC. The Building Official may require plans and specifications to be prepared by a registered design professional for Complex Systems or where, in the Building Officials opinion, an unregistered designer has not demonstrated competency to design the system.

### **Connections to Potable or Reclaimed (recycled) Water Systems (CPC 1602.4)**

Rainwater catchment systems shall have no unprotected connection to a potable water supply or alternate water source system. Potable or reclaimed water is permitted to be used as makeup water for a rainwater catchment system provided the potable or reclaimed water supply connection is protected by an air gap or reduced pressure principle backflow preventer in accordance with the plumbing code.

### **Minimum Water Quality Requirements (CPC 1601.7)**

The minimum water quality for rainwater harvesting systems interconnected with the building plumbing system is established by the water purveyor and authority having jurisdiction for the water supply system. In the City of Carmel, this includes the Monterey Peninsula Water Management District and California American Water. There are two exceptions to water quality requirements which include:

1. Water treatment is not required for rainwater harvesting systems used for above ground irrigation with a maximum storage capacity of 360 gallons.
2. Water treatment is not required for rainwater harvesting systems used for surface, subsurface, or drip irrigation.

### **System Components (CPC 601.3.3, 1602.7)**

Components, piping and fittings used in any rainwater harvesting system shall be listed.

### **Tanks**

#### **Location (CMC Title 17)**

The Carmel Municipal Code prescribes setbacks for tanks serving water harvesting systems. Tanks and their supporting structures must be located at least three feet from any side or rear property line, and fifteen feet from the front property line. Tanks may not be visible from the right-of-way.

### **Construction (CPC 1603)**

The CPC requires that rainwater storage tanks be constructed of solid, durable materials not subject to excessive corrosion or decay, shall be watertight, and shall be in accordance with approved, applicable standards. Tanks may be located either above ground or underground.

When installed above ground, the tank shall be constructed of an opaque material approved for above ground use in direct sunlight, or shall be shielded from direct sunlight. Tanks must be installed in an accessible location to allow for inspection and cleaning. The tank must be installed on a foundation or platform that is constructed to accommodate the weight of the tank and contents, and is anchored against movement due to seismic forces.

Tanks installed underground are required to be structurally designed to withstand the anticipated earth and other loads imposed on the tank. Tank covers shall be capable of supporting an earth load of not less than 300 pounds per square foot. Underground tanks shall be provided with manholes not less than 24 inches square or with an inside diameter of not less than 24 inches. Service ports in manhole covers shall be not less than 8 inches in diameter. The manhole opening shall be located not less than 4 inches above the surrounding grade and the surrounding grade shall be sloped away from the manhole.

Underground tanks shall be ballasted, anchored, or otherwise secured, to prevent the tank from floating out of the ground when empty. The combined weight of the tank and hold down system shall meet or exceed the buoyancy force of the tank.

### **Drainage and Overflow (CPC 1603.6)**

Tanks are required to have an overflow drain. The overflow drain outlet shall discharge in accordance the City's requirements for private, on-site storm drainage systems. Where discharging through closed piping to a storm drainage system, the overflow drain (and tank drain) shall be protected from backflow of the storm drainage system by a backwater valve or other approved method. Backwater valves shall be installed so that access is provided to the working parts for service and repair. The overflow drain shall not be equipped with a shutoff valve. The overflow outlet must be sized to accommodate the flow of rainwater entering the tank, and shall be not less than the aggregate cross-sectional area of the inflow pipes. Overflow must be contained on the site and MAY NOT be allowed to cross property lines or flow onto the public right-of-way.

### **Venting (CPC 1603.9)**

Where venting by means of drainage or overflow piping is not provided, or is considered insufficient, a vent shall be installed on each tank. The vent shall extend from the top of the tank and terminate not less than 6 inches above grade and shall be provided with a vent sized in accordance with the CPC and based on the size of the influent pipe. The vent terminal shall be pointed downward and covered with a

1/16 inch mesh.

**Marking (CPC 601.3.2, 1603.8)**

Rainwater tanks shall be permanently marked with the tank capacity and clearly legible text stating “NONPOTABLE RAINWATER”. Where openings are provided to allow a person to enter the tank, the opening shall be permanently marked with the following language “DANGER – CONFINED SPACE”.

**Cleaning (CPC 1601.5, 1603.14, 1603.15)**

Rainwater storage tanks and the rainwater conveyance system must be provided with a means of draining and cleaning. The system shall be equipped with a debris excluder or other approved means to prevent the accumulation of leaves, needles, other debris, and sediment from entering the storage tank. In addition, the CPC requires rainwater tank openings to be protected to prevent the entrance of insects, birds, or rodents into the tank and piping systems. Opening protection is required as follows:

1. Screens installed on vent pipes, inlets and overflow pipes shall have an aperture of not greater than 1/16 inch and shall be close fitting.
2. Human access. A minimum of one access opening shall be provided to allow inspection and cleaning. Rainwater tank manholes and access openings shall be secured by either a lockable device or other approved method to prevent unauthorized access.

Devices or methods used to remove debris or sediment shall be accessible and sized and installed in accordance with the manufacturer’s installation instructions.

**Piping (CPC 1101.4, 1602.7)**

Piping for rainwater harvesting systems may be of any type of material acceptable to the CPC for stormwater conveyance piping (e.g. Schedule 40 ABS and PVC drain, waste and vent pipe, galvanized steel, stainless steel, cast iron, wrought iron, copper, or copper alloy). Piping must be installed in accordance with the CPC and the manufacturer’s specifications. Piping for non-potable rainwater systems must be identified by the words “CAUTION: NONPOTABLE RAINWATER WATER, DO NOT DRINK” printed on purple colored pipe or on a purple colored band applied with paints, wraps, or other material compatible with the piping. In addition to the text warning, piping must also be marked with the international symbol for non-potable water as shown in Figure 601, and an arrow indicating the normal water flow direction. The minimum length of the color field and size of lettering must comply with CPC Table 601.3.2.

Outside Diameter of Pipe or Covering (Inches)	Minimum Length of Color Field (Inches)	Minimum Size of Letters (Inches)
½ to 1 ¼	8	½
1 ½ to 2	8	¾
2 ½ to 6	12	1 ¼
8 to 10	24	2 ½
Over 10	32	3 ½

**Table 601.3.2**  
**Minimum Length of Color Field and Size of Letters**



**Figure 601**  
**International Symbol for Non-Potable Water**

**Outside Hose Bibbs (CPC 1602.9.1)**

Outside hose bibbs shall be allowed on non-potable rainwater harvesting systems. Hose bibbs supplying rainwater shall be marked with the words: “CAUTION: NONPOTABLE WATER, DO NOT DRINK and the international symbol for non-potable water shown in Figure 601.

**Roof Drains (CPC 1603.11)**

Primary and secondary roof drains, conductors, leaders, and gutters shall be designed and installed in accordance with the CPC.

**Pumps (CPC 1603.10)**

Pumps serving nonpotable rainwater harvesting systems shall be listed and labeled in accordance with the requirements of the CPC. Pumps shall provide a maximum water pressure of 80 psi at the outlets of the system.

**Inspection and Testing (CPC 1605.0)**

Nonpotable rainwater harvesting systems requiring a permit shall be inspected and tested in accordance with the CPC requirements for potable water and storm water systems. To allow for leak detection and identification, no piping, tanks, or other components may be covered or concealed until inspected and approved by the City. Storage tanks shall be filled with water to the overflow opening for a test period of 24 hours, and must remain full throughout the test period and inspection. Inspection will also verify compliance with backflow and cross-connection prevention requirements.