

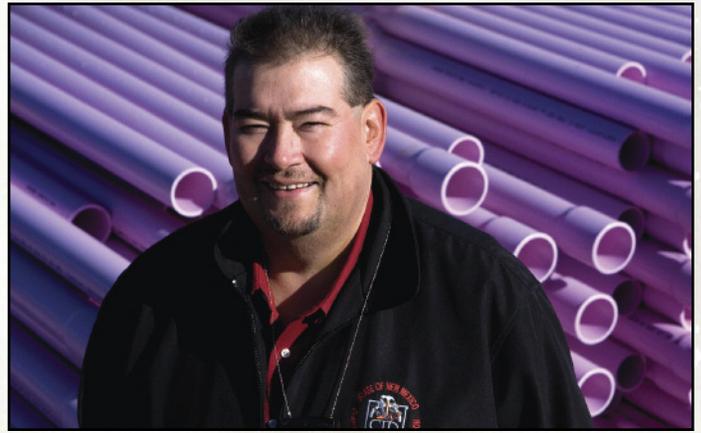
# Housing With A Plan

## ***New Mexico's Construction Industries Division's Mechanical/Plumbing Bureau Leading the Way in Water Conservation Codes Development***

By Heather Winkel  
Director of Public Outreach, CID

**W**hat comes to mind when you hear the terms “green building” or “environmentally-friendly”? Is it recycling construction waste or using renewable resources in building? If so, you're not alone. Those concepts are very common when conservation is brought up in polite company.

Reclaiming household bathroom water, on the other hand, isn't typically the first thing we think about when we hear “green.” I, for one, am not comfortable entertaining thoughts of re-using the water that goes down the toilet, much less discussing how to do it.



**J.T. Baca, Mechanical/Plumbing bureau chief for the State of New Mexico's Construction Industries Division, has been integral to the state's leading-edge promotion of reclaimed water systems.**

Enter J.T. Baca, Mechanical/Plumbing bureau chief for the State of New Mexico's Construction Industries Division. Baca's passion is researching methods of reclaiming water for residential applications and approving them for actual use. He has been integral in the development and implementation of a state-of-the-art residential reclamation system in the La Pradera subdivision (Project) south of Santa Fe.

“Code compliance is not the only consideration when reviewing alternative systems,” Baca said. “Ease of use, added construction costs and maintenance requirements are the top three priorities to the owner of the home.”

### ***In the Beginning***

The developer of the Project had a vision, and presented the concept to Baca.



“I was up to here with the other responsibilities of a bureau chief,” Baca said. “But I was intrigued by the concept, and felt it was my duty to explore the possibilities, not so much for the developers, but for the people of New Mexico. I was born and raised here and have an appreciation for our scarce natural resources.”



Homes in the La Pradera subdivision feature a Southwestern adobe-style appearance that complements the xeriscape vegetation that will be irrigated by rainwater collected at each home.

The Project is a planned community of 63 single-family homes, 11 condominiums and three duplexes on 69 high-desert acres. The community design incorporates drought-tolerant vegetation and a community orchard, both to be irrigated with reclaimed household water.

“We wanted to target a forward-thinking homeowner,” said John McCarthy, one of the project developers. “This gives individuals a chance to give back, an actual way to participate. We had selected water use as the area of conservation on which we wanted to concentrate.”

## Variance Request

The State of New Mexico had adopted and amended the 2003 Uniform Plumbing Code (UPC) as the minimum standard for the state (New Mexico is one of the few states that have a statewide plumbing and mechanical code). Although the UPC’s Appendix G sets out the requirements for grey water use in residential applications, the code doesn’t address reclaimed water for residential use. It does, however, provide for reclaimed water in commercial projects.

“There is no reason Appendix J\* cannot be used for residential purposes,”

\*Appendix J was moved to Chapter 16, Part II in the 2006 UPC.

Baca said. “The only part that seems to be lacking (in Appendix J\*) is educating the homeowner on the maintenance and function of the systems. The developers appear to have that well in hand, as conserving water is one of the major selling points of the Project.”

## Appendix J\* Adaptations

Baca is working closely with the contractors, inspectors and the developer to identify appropriate sections of Appendix J\* for single-family dwellings. At the time this article was written, the following sections have been modified or adapted by the state of New Mexico as part of the variance for this Project:

### Section Language — Modification/Adaptation

#### J 1 Reclaimed Water Systems – General (B)\*\*

**Language:** No permit for any reclaimed water system shall be issued until complete plumbing plans ... have been submitted  
**Modification/Adaptation:** Remains a requirement for residences installing reclaimed water systems. CID does not require plans for other single-family residence plumbing systems. \*\*[Chapter 16, Part II, 1613.0 (B) in 2006 UPC]

#### J 3 Permit\*\*

**Language:** It shall be unlawful for any person ... without first obtaining a permit...  
**Modification/Adaptation:** Still a requirement, however, CID adapted its residential permit application to include potable and reclaimed water distribution systems. \*\*[Chapter 16, Part II, 1615.0 in 2006 UPC]

#### J 5 Pipe Material/Pipe Identification\*\*

**Language:** ... all reclaimed water pipe and fittings shall be continuously wrapped with purple-colored Mylar tape.  
**Modification/Adaptation:** If purple piping tape is not available, CID allows the pipes to be painted purple every three feet or use of factory-tinted purple piping. \*\*[Chapter 16, Part II, 1617.0 in 2006 UPC]



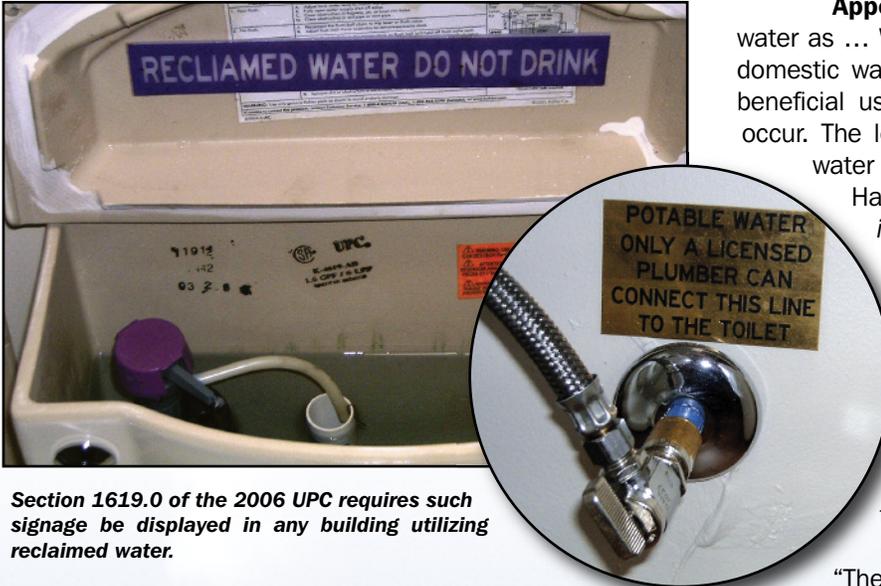
Pipes and fittings that are part of the reclaimed waste water system are spray painted purple in accordance with the CID modification of Appendix J 5 of the 2003 UPC [Section 1617.0 of the 2006 UPC].



**J 7 Signs (A)(B)(C)(D)\*\***

**Language:** Room Entrance Signs, Equipment Room Signs, tank-type water closet signs, Valve Access Door Signs.

**Modification/Adaptation:** Room Entry and Equipment Room signs are not required; tank-type water closet signs must be affixed to the inside of the tank lid; Valve Access door Signs are not required, however, signage at the valve supply outlet is required. **\*\*[Chapter 16, Part II, 1619.0 in 2006 UPC]**



**Section 1619.0 of the 2006 UPC requires such signage be displayed in any building utilizing reclaimed water.**

One section of Appendix J\* will remain as a strict requirement for all single-family dwellings that have a reclaimed water system: **J 8 Inspection and Testing (C)\*\*** — Annual Inspections. Both the developer and CID are adamant that the systems are inspected on an annual basis to ensure no cross-contamination has occurred and most importantly, that water continues to be reclaimed. **\*\*[Chapter 16, Part II, 1620.0 in 2006 UPC]**

**J 10 Approved Uses of Reclaimed Water\*\***

**Language:** Reclaimed water is allowed in all non-residential buildings to supply fixtures as specified ...

**Modification/Adaptation:** Reclaimed water is allowed in residential settings, provided UPC requirements for commercial buildings are met.

**\*\*[Chapter 16, Part II, 1622.0 in 2006 UPC]**

“We strongly believe in the long-term benefits of conserving water,” McCarthy explained. “We do not want these systems being disconnected or falling into disrepair. The inspection provision will be a requirement by the community and homeowners association.”

**Water Treatment Facilities**

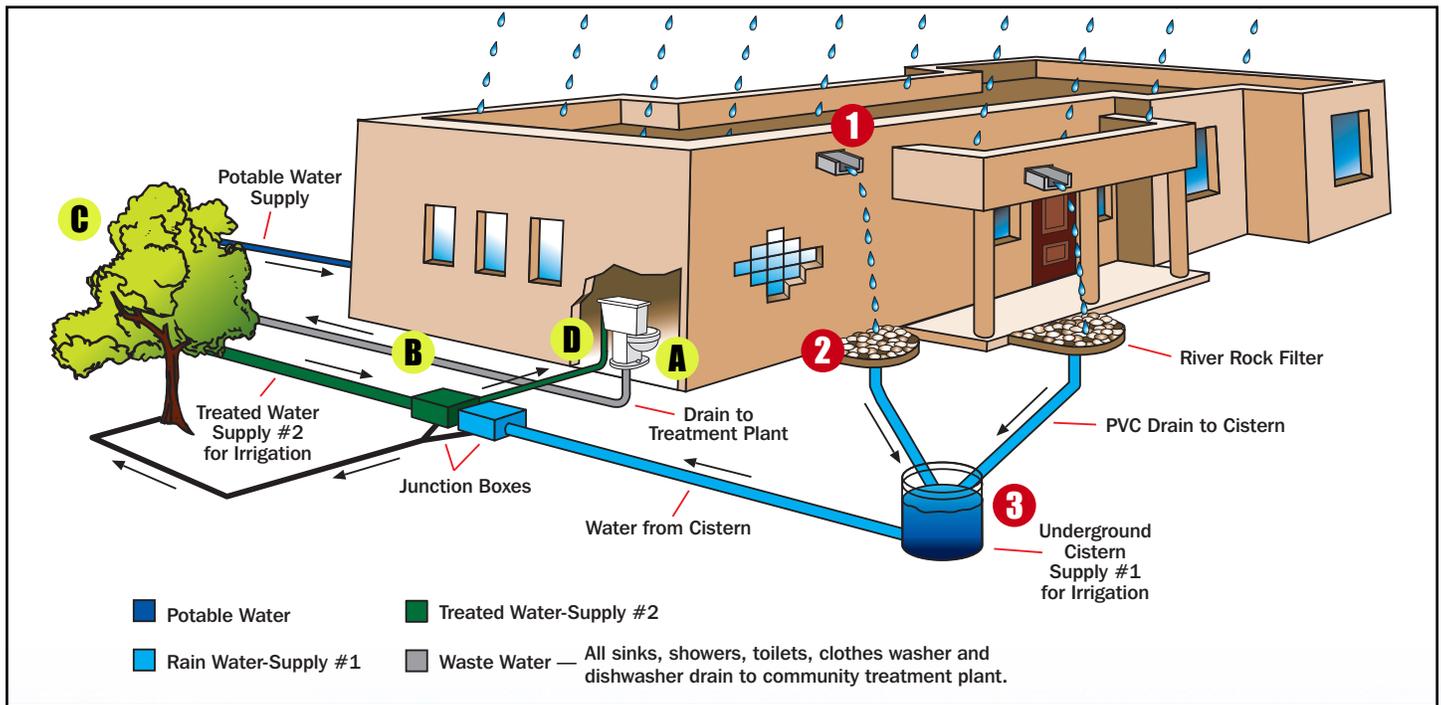
**Appendix J 2 Definitions\*\*** defines reclaimed water as ... Water which, as a result of tertiary treatment of domestic water by a public agency, is suitable for a direct beneficial use or controlled use that would not otherwise occur. The level of treatment and quality of the reclaimed water shall be approved by the public health Authority Having Jurisdiction. **\*\*[Chapter 16, Part II, 1614.0 in 2006 UPC]**

Even before CID granted the variance to Appendix J\*, the developers were working with the New Mexico Environment Department (NMED) on the water treatment issue. The NMED was hesitant to fully commit to the testing and inspection requirements these facilities demand, so again, CID took the lead.

“The NMED was concerned that spending the time and resources needed would have an appearance of bias or favoritism surrounding this particular Project. Since we (CID) have fewer layers of governmental oversight, we were able to work with them to provide a satisfactory solution,” Baca said.

That solution included private treatment facilities whose design was approved by NMED and inspected for code compliance during construction by CID. Maintaining the treatment plants and testing the output is the responsibility of the developer. The first of three facilities, two treatment plants and a lift pump, have been completed; the collaboration and construction methods have become a prototype for future developments.

*\*Appendix J was moved to Chapter 16, Part II in the 2006 UPC.*



## How It Works

In a nutshell, La Pradera homes will recycle 100 percent of their wastewater, with the reclaimed portion returning to the residence in the form of toilet flush water. All of the water that drains from any of the 80 homes and condominiums — toilet, sink, shower, etc. — will actually be filtered and treated on site at one of two treatment facilities that service only La Pradera.

Reclaimed water will only re-enter the homes via the toilet. Potable water from public water supplies will continue to flow through taps.

In addition, no irrigating of common landscapes within the community will be done with potable water. Instead, collected rainwater will be stored and used to irrigate the xeriscape (drought-tolerant) vegetation. In the event the rain-water stores are emptied, the reclaimed supply will be used as a backup.

## Two Phases of Recycling Water to be Utilized at La Pradera

### Rain Water

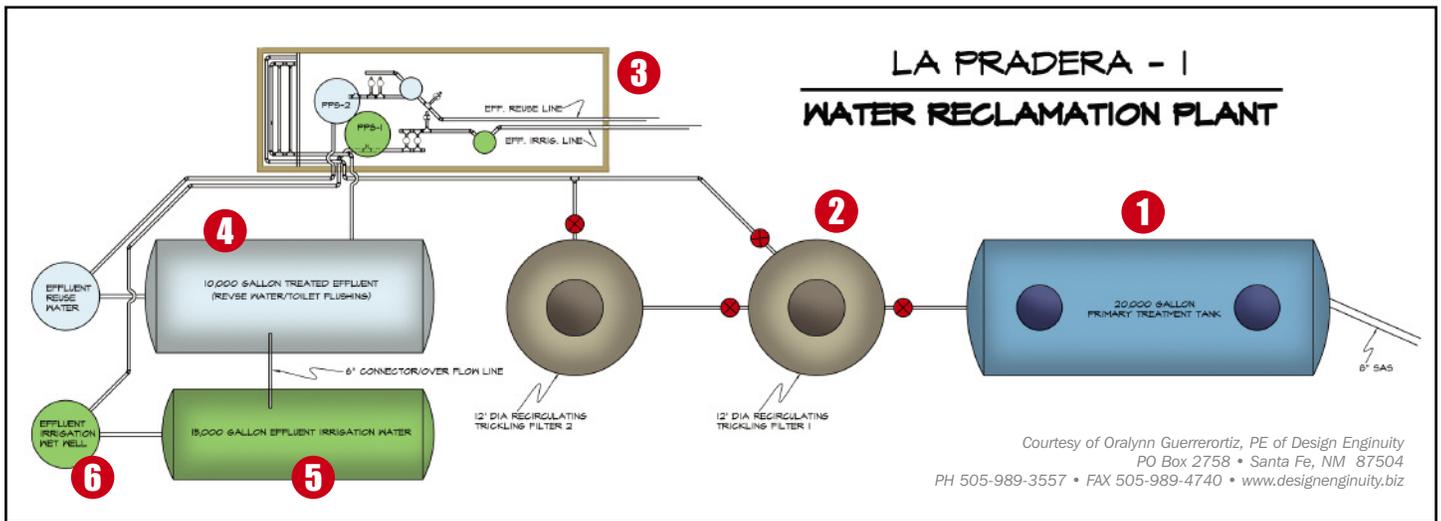
1. Rain water is collected from the roof and exits through two canales.
2. From the canales, collected water pours down through decorative gravel into a discretely disguised piping system to an underground, 2,400-gallon cistern.
3. Water goes from cistern to landscape through a series of sub-surface irrigation tubes, similar to a drip irrigation system.

### Reclaimed Waste Water

- A. 100 percent of drain water from the home exits via sanitary piping system.
- B. Waste water is transferred to one of two micro-treatment plants.
- C. Water undergoes ultraviolet and aerobic process for purification, cleansed to a quality that is acceptable to the NMED, meeting the minimum requirements of tertiary standards for reuse.
- D. Once tertiary standards are met, water is piped back to the residential structure via a piping system — separated from the potable water system — for use in flushing toilets (which accounts for about one-third of a typical home's water use) and outdoor irrigation.

The reclamation of water is enhanced by the code requirement for low-water use fixtures, and a requirement that prohibits outside hose bibs. Strict covenants and landscape requirements, namely native xeriscape vegetation, further eliminate the need for potable water in landscaping.

*One of the two micro-treatment plants that will service La Pradera, utilizing ultraviolet and aerobic process purification before returning the water to homes.*



## A Work in Progress

Home construction in the Project is moving along, and with that, so is the development of protocols, procedures and training. Aside from his day-to-day duties, Baca spends a considerable amount of time with his inspectors assigned to the Project to make sure they understand the intent of Appendix J\* and enforce the provisions accordingly. He has implemented mandatory monthly meetings with the general and plumbing contractors on site to accomplish three things:

- Point out what's being done right;
- Point out what's being done wrong; and
- Take suggestions for additional adaptations of Appendix J\*, permit requirements and inspection processes.

In addition, Baca is working with the homeowner's association to develop reasonable, workable and effective upkeep requirements for the reclamation system that the property owners need to be aware of. He continues to work with the NMED on statewide criteria for private treatment facility operators maintaining and testing similar facilities, not to mention drafting regulatory language to incorporate Appendix J\* modifications/adaptations into the current New Mexico codes, so others in the future won't need go through the variance process in order to install reclamation systems in single-family homes.

## Is it Worth It?

As I was interviewing Baca for this article, I asked him if all the extra time he's put in, (and personal time he's given up) has put a strain on his already jam-packed schedule.

"Of course, it isn't easy," he said with a grin. "But it sure is fun." 🛠️

## Water Reclamation Plant at La Pradera

1. Untreated waste water enters through the 8-inch sewer line into the 20,000 gallon primary treatment tank. (right end of diagram)
2. Separated liquid waste travels to 12-foot diameter recirculation tank or tanks, which can operate either parallel or in series, where the water is subjected to an aerobic process.
3. Next, the water travels to the UV and Ozone station where water is disinfected. (square box).
4. Next, treated waste water is sent to the 10,000 gallon storage tank and used for toilet flushing.
5. 15,000 gallon tank for irrigation is filled by overflow to protect primary treated tank drainage due to excessive irrigation.
6. Reclaimed water can then be pumped by constant pressure pumps to the individual residences and/or to the landscape via a sub-surface irrigation system.

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Photos by Kitty Clark Fritz and Heather Winkel