

Section 5

Recycled Water Master Plan

5.1 Agency Coordination

In 2004 and 2005, the Big Bear Area Regional Wastewater Agency (BBARWA), working along with the City of Big Bear Lake Department of Water and Power (DWP), and the Big Bear Lake City Community Services District (CSD), cooperated in the preparation of a Draft Recycled Water Master Plan for the Big Bear Valley, which has yet to be finalized. BBARWA, which provides wastewater management to the Big Bear Valley (Valley) decided that they needed to seek to expand its use of effluent from its wastewater treatment plant to produce recycled water within the Valley. The Master Plan, whose implementation will result in benefits to all three agencies, includes: reduction of the Valley's dependence on limited groundwater supplies, extension of available water resources, and provision of valuable economic and environmental benefits to the Valley's communities.

Table 5-1 Participating Agencies	
Participating Agencies	Role in Plan Development
City of Big Bear Lake Department of Water and Power	-Provided information as needed during development of the Plan -Identified potential recycled water users within their service area
Big Bear City Community Services District	-Provided information as needed during development of the Plan -Identified potential recycled water users within their service area
Big Bear Area Regional Wastewater Agency	-Prepared the Recycled Water Master Plan -Contributed funding to the development of the Plan -Leading the way in funding and implementing the recommendations of the Recycled Water Master Plan

The objectives of the Recycled Water Master Plan are to investigate the feasibility of using recycled water throughout the Big Bear Valley. It provides a comprehensive planning document that outlines a phased road map for incremental implementation of facilities to achieve the listed benefits. In order to evaluate the potential for water recycling, the Master Plan included these key activities:

- Market Assessment
- Supply Evaluation
- Demand Evaluation
- Facilities Analysis
- Cost Analysis

These activities were used to develop a phased approach to implementation of a recycled water program. The user implementation of the Plan was divided into 8 phases, because of the distinct geographic areas where the users located. Some phases cannot happen until earlier phases are implemented, while other phases could be implemented in random order after Phase 1 is implemented. The recycled water supply implementation is divided into 4 improvement phases at the wastewater treatment plant, each phase in 500 acre-foot increments.

5.2 Wastewater Collection and Treatment System

Wastewater collection systems within the service area for DWP are not operated by the DWP, but by the City of Big Bear Lake, the Big Bear City Community Services District, and the County of San Bernardino County Service Area 53B. These collection systems deliver wastewater to BBARWA's interceptor system for transport to the Regional Wastewater Plant (WWTP). The BBARWA was formed in March 1974, and its service area includes the entire 79,000 acres of the Big Bear Valley. The BBARWA operates 3 main lines; the LPS force main that services the City of Big Bear Lake's wastewater system, the North Shore Interceptor that services the county's wastewater system, and the BBARWA Trunk Line that services the CSD's wastewater system and conveys flow from the North Shore Interceptor to the treatment Plant. The wastewater flows from the three main lines and is conveyed to the BBARWA WWTP located at Baldwin Lake.

The BBARWA system is composed of a 4.89 mgd secondary wastewater treatment plant, 14.6 miles of sewer pipeline, and 1.5 miles of existing recycled water pipeline. The average daily flow treated by BBARWA WWTP is approximately 2.2 mgd. The BBARWA Regional Wastewater Treatment Plant provides secondary treatment of influent, which consists of the following:

- Preliminary Treatment – Consisting of screening of solids with bar screens, grit removal, and landfill disposal of solids.
- Secondary Biological Treatment – Consisting of oxidation ditches using mechanical aeration, achieving organic material stabilization, nutrient removal via “symbio” process and pathogen reduction.
- Secondary Sedimentation Treatment – Consisting of solids settlement in clarifiers, pumping of waste activated sludge (WAS) to a dissolved air floatation system, and returning activated sludge to the oxidation ditches.
- WAS Thickening – Consisting of a DAF system that skims sludge for sludge dewatering, using a belt filter press and a system that pumps the filtrate to the oxidation ditches.

- Sludge Dewatering - Consisting of a belt filter press or sand / asphalt drying beds that produces belt filter cake for disposal and return filtrate to the oxidation ditches.
- Sludge Disposal - The dewatered solids are hauled to either Nursery Products composting facility in Adelanto, the Synagro composting facility in Corona, or incinerated at the Mitsubishi cement plant in the Lucerne Valley. The Nursery Products and Synagro plants compost the solids to produce commercially available compost. The Mitsubishi cement plant burns the solids in their kilns to reduce harmful NOx emissions from their smokestacks.
- Water Reclamation - Effluent from the plant is used for irrigation, construction, and wildlands fire-fighting purposes. Recycled water is stored on site in either a storage tank or an existing unused chlorine contact chamber.

Secondary Effluent quality is summarized in the following table, using annual data from the year 2003.

Table 5-2 Secondary Effluent Quality			
Parameters	Units	Values	Secondary Effluent Discharge Requirements
Flow	mgd	2.2	-
pH	SU	7.4 – 8.3	6.5 - 8.5
Conductivity	Umhos	725	-
BOD	mg/l	8.0	30
TSS	mg/l	7.1	30
TDS	mg/l	419	520
Chloride	mg/l	47	60
Sodium	mg/l	65	-
Manganese	mg/l	<0.02	-
Iron	mg/l	<0.1	-
Total Inorganic Nitrogen	mg/l	3.8	10
Total Phosphorus	mg/l	1.5	-
Sulfate	mg/l	41	60

The water discharged from the WWTP fulfills the requirements of Secondary Effluent. None of the wastewater treated by the WWTP is currently discharged or treated to recycled water standards.

Table 5-3 Wastewater Collected and Treated – AF/Y						
	2000	2005	2010	2015	2020	2025
Wastewater collected and treated in service area	3,432	2,766	2,700	2,700	2,750	2,750
Quantity that meets recycled water standard	0	0	0	0	0	0

Table 5-3 represents the quantity of wastewater collected and treated in the past and projected into the future. The year 2000 was a year with higher than normal precipitation, resulting in a higher quantity of wastewater treated. The average annual flow to the treatment plant is approximately 2,766 acre-feet. BBARWA examined the historical wastewater flow data, as well as projected data in their Recycled Water Master Plan and saw no apparent justification for an increase in wastewater flow in the future. They estimate that wastewater flows will show a downward trend in the future. They cite such factors as reduced infiltration and inflow, and new plumbing codes that mandate low flow fixtures for new construction, and retrofit programs for replacement of existing fixtures.

5.3 Disposal of Non-Recycled Wastewater

The table below shows the disposal of non-recycled wastewater from the WWTP. Presently, the vast majority of the water, 99.6%, is discharged to a 480 acre site in the Lucerne Valley, where it is used to irrigate alfalfa fields. A small portion, 11 acre-feet, is further treated and under three California Regional Water Quality Control Board WDR permits, provided to 139 user accounts of various types, such as irrigation and construction water.

Table 5-4 Disposal of Wastewater (Non-Recycled) – AF/Y						
Method of Disposal	Treatment Level	2005	2010	2015	2020	2025
Discharge to Lucerne Valley	Secondary	2,755	2,755	2,100	2,100	1,475

This table also assumes that the Recycled Water Master Plan is implemented as written, with the first stage of construction completed in 2010, and Stage 2 completed in 2014. Each phase will increase the recycled water produced by the WWTP by 500 acre-feet per year, thereby reducing the disposal of non-recycled wastewater by approximately 625 acre-feet per stage.

5.4 Current Recycled Water Uses

Presently, the BBARWA treats a small quantity of water under three RWQCB permits to Title 22 standards at the WWTP from an existing pilot MF and RO system. Up to 0.4 MG of tertiary water is stored at the plant for distribution. This water is provided to 139 users of various types. The table below outlines those uses.

Table 5-5 Current Recycled Water Use		
Type of Use	Treatment Level	2005 AF/Y
Agriculture	Recycled Water	0
Landscape	Recycled Water	1.32
Wildlife Habitat	Recycled Water	0
Wetlands	Recycled Water	0
Industrial	Recycled Water	0
Groundwater Recharge	Recycled Water	0
Construction	Recycled Water	9.68
Other	Recycled Water	0
Total	---	11.0

Irrigation users comprise the largest number of accounts, but use significantly smaller amounts of water than construction uses. Irrigation use currently is permitted via a Valley-wide permit, where recycled water is delivered to individual homeowners and distributed from on-site holding tanks by the individual property owners. Construction use for dust control and soil compaction is delivered to the contractors at the BBARWA facility for use at various construction sites. During the recent drought, an ordinance restricting the use of potable water for dust control provided incentive for contractors to use recycled water on their construction sites.

5.5 Potential Recycled Water Uses

BBARWA's Recycled Water Master Plan has identified numerous opportunities for recycled wastewater (Table 5-6). Although these opportunities are listed in the Master Plan, the emphasis of the Plan is the use of recycled water for groundwater recharge.

Table 5-6 Potential Recycled Water Uses –AF/Y					
Type of Use	Treatment Level	2010*	2015	2020	2025
Agriculture	Title 22	0	0	0	0
Landscape	Title 22	0	440	440	440
Wildlife Habitat	Title 22	0	49	49	49
Wetlands	Title 22	0	66	66	66
Industrial	Title 22	0	600	600	600
Groundwater Recharge	Title 22	0	1,000	1,000	1,000
Other	Title 22	0			
Total	---	0	2,155	2,155	2,155

* Recycled Water not scheduled to be available until 2011

Once the infrastructure required for groundwater recharge is in place, the Recycled Water Master Plan calls for the phasing in of other potential recycled water customers. This will occur as funds become available.