CITY OF HOLLISTER MASTER RECLAMATION REQUIREMENTS CENTRAL COAST RWQCB

ORDER NO. R3-2008-0069

2010 ANNUAL REPORT

JANUARY 31, 2011

Contents

Figures

Appendixes

Tables

1 INTRODUCTION

The City of Hollister (COH) owns and operates the domestic wastewater treatment plant (DWTP) and recycled water treatment and distribution system, located at 2690 San Juan Hollister Road, Hollister, California, San Benito County, approximately 2 miles west of the city. The 4-million-gallon-per-day (MGD) capacity domestic treatment facility uses membrane filtration technology in the form of an immersed membrane bioreactor (MBR) and sodium hypochlorite disinfection to achieve tertiary level of wastewater treatment. Treated wastewater is discharged to DWTP and the Industrial Wastewater Treatment Plant (IWTP) percolation ponds or delivered to Brigantino Park and the Hollister Municipal Airport for irrigation purposes. As the recycled water is increasingly merged for irrigation reuse, it is expected that wastewater disposal to storage ponds will be reduced. Reuse and disposal of the recycled water is regulated pursuant to Master Reclamation Requirements (MRRs) issued by the Central Coast Regional Water Quality Control Board (CCRWQCB; Order No. R3 2008-0069).

FOOTNOTE - As reported in the third Quarterly Report. Veolia Water West Operating Services, Inc. assumed Operation & Maintenance of the Hollister Water Reclamation Facility. From August 3 thru September 3, 2010 the operation and maintenance was facilitated in conjunction with the City of Hollister Operations Staff, HydroScience Operations & Maintenance Staff and Veolia Water West Operating Services, Inc. HydroScience Operations & Maintenance Staff was contracted by the City of Hollister to operate and maintain the facility and assist in the transition of City of Hollister and HydroScience Operations & Maintenance to Veolia Water West Operating Services, Inc.

2 INFLUENT MONITORING

Water supply monitoring results is shown in Appendix A1.

DWTP influent was sampled in accordance with the specified constituents/parameters and frequencies identified in the MRP. Monitoring results are provided in Appendix A2.

Daily average influent flow to the DWTP did not exceed 4.0 MGD, in accordance with the MRRs and design capacity of the DWTP. Influent and effluent flow meter calibration was performed and results are provided in Appendix A6.

FOOTNOTE - During the time period of August 3, thru September 12, 2010, laboratory analysis was performed by Bracewell Engineering Inc. On September 13, 2010, Veolia Water West Operating Services, Inc. switched laboratory services and analysis to Bolsa Analytical Laboratories.

During the transition of lab services, it was discovered that incorrect lab documentation was being listed for the Influent Settleable Solids Test by Bracewell Engineering. The incorrect lab description was Settleable Matter EPA 160.5 mL/L-30 min instead of Influent Settleable Solids SM2540 F which was actually the test performed.

Appendix 3 contains a letter by Bracewell Engineering, Inc. documenting the correction and past lab reports will be re-issued with the corrected method identified.

It is also noted that during the transition between Bracewell Engineering and Bolsa Analytical it was realized that the time requirements for the testing of pH were not being met. There were two occurrences one each on Sept. 21 & 27. This was corrected by returning to the use of Bracewell Engineering for the lab analysis of pH who reside onsite to meet the time requirements.

As of September 27, 2010, both analytical discrepancies have been corrected.

3 EFFLUENT MONITORING

Representative samples of the domestic treatment facility effluent were collected and analyzed in accordance with the constituents/parameters and frequencies specified in the MRP. Results are provided in Appendix A3.
The rolling 12-month average concentration of total nitrogen (TN) exceeded the effluent limitation of 5.0 milligrams per liter (mg/L) (12-month rolling average) for 12 month of the year beginning in January 2010 (see Appendix 4).

These exceedances of TN were investigated by the COH and HydroScience Operations and Engineers (A report is on file from HydroScience Engineers and is included in this Appendix 4).

3.1 Total Nitrogen Studies

During the year, Hydro Science Operations continued studies to improve the Facility's total nitrogen removal summarized in Appendix A4

When Veolia Water West Operating Services, Inc. assumed operation and maintenance of the Hollister Facility, they began an independent study into the Total Nitrogen phenomenon. Beginning approximately September 30, 2010 Veolia began a pilot sampling program for Nitrate as NO3.

Veolia Water plant staff continued to conduct pilot sampling analysis periodically through the end of December 2010 utilizing a HACH DR 2800 unit. As stated previously the purpose was to evaluate the nitrate component N03 to get a better understanding and clarification of historically elevated values. These values have been historically above 5.0 mg/l.

Process control changes that have been made during this time. Mixed liquor suspended solids concentration has been maintained at approximately. 9200-9500 mg/l. Pre-determined recirculation rate adjustments were made between 7.2Q and 4.0Q. Currently the recirculation set point is at 6.5Q where the process appears more stable as it relates to lower Nitrate (NO3) values.

The Dissolved Oxygen (D.O.) control valve logic may be a component of the issue and will be investigated in more depth in the near future. The pilot study encompasses the use of a discrete sampler downstream of compliance point at the end of the Chlorine Contact Basin # 2 (CCB # 2).

The installation of Nitrate and Ammonia probes is being evaluated and considered to better track the two values in real time mode.

Down stream of the compliance point at the end of the CCB # 2, composite sampling results have indicated an average value of 4.3 mg/l NO3 as Nitrate based on 32 sampling events. The Nitrate values appear to be adversely affected when decreasing the recirculation rate down to 4.0Q set point. The pilot study will continue on an interim basis as the process is monitored and adjustments are carefully considered, introduced and evaluated.

Going forward Hollister Veolia plant staff has worked in partnership with Veolia Water NA Technical Development Group and Technical Resources Group to formulate a draft of the Hollister, CA WDR Domestic Water Recycling Facility Veolia Water Compliance Action Plan Nitrate and Total Nitrogen.

Past studies have documented diurnal concentration variance in nitrogen product concentrations in both the influent and effluent. The Facility has recently received Regional Board permission to change the total nitrogen compliance testing from grab to composite samples.

3.2 Flow Meter Discrepancies

For the past year the facility has recorded significant difference in the calculated influent flow compared to the effluent flow (15% to 20%). A summary of the steps taken to explain the disparity was summarized in the 2009 annual report. Investigations, repairs and/or recalibrations have continued to the point that the September 2010 influent and effluent values are within 2%.

In late July 2010, a problem with the Chlorine Contact Basin (CCB) inlet flow meter (one of the three meters used to calculate the effluent flow) not registering low flows was noted. Telstar Instruments Inc. inspected the unit, determined that the flow sensor was suspect, and could be faulty, not registering flow at low flow situations resulting in an underestimation of effluent flow. The sensor was removed on August 9, 2010 and returned to the factory for warranty repair.

The sensor on the CCB bypass meter (second of three used to calculate effluent flow) was used to replace the CCB inlet sensor so that proper automatic disinfection would be maintained. CCB bypass flow was routed through another flow meter and effluent flows were calculated using these meters. On September 23, 2010 Advanced Flow Measurement Company calibrated the influent and effluent flow meters, found the influent flow meter to be reading about 7% high, resulting in an over estimation of flow and adjusted it down by 7% as allowed during the calibration process. The CCB inlet meter sensor was returned on October 14, 2010, re-installed, and calibrated by Advanced Flow Measurement Company on Oct. 29, 2010 and November 3, 2010 respectively.

4 STORAGE FACILITY MONITORING

Figure 3 shows the DWTP and location of storage ponds. Representative samples from storage ponds were taken in accordance with the constituents/parameters and frequencies specified in the MRP. Required constituents/parameters include pH, dissolved oxygen (DO). Grab samples are to be analyzed weekly for DO and pH.

Samples are analyzed at when pond depth are at 1-foot depths or more from at least three representative locations within each treatment/disposal pond, and the results are reported reflect the average value for the three sampling locations (see Appendix A5).

5 BIOSOLIDS REMOVAL

No solids/biosolids were removed from the DWTP during 2010.

6 GROUNDWATER MONITORING

Locations of groundwater monitoring wells at the DWTP are shown in Figure 4. Groundwater sampling occurred in January, April July, and October 2010, See Appendix 7 Groundwater Monitoring Wells spreadsheet for DWTP Monitoring Wells MW-3, MW-4, MW 03-1S, P-8D and P-10D.

SECTION 7

Recycled Water Use Area Monitoring

This section of the Annual Report describes irrigation water and nutrient applications to each use area and also reports the groundwater monitoring results. Hydraulic and nutrient loading, as well as potential impacts related to use of recycled water for irrigation purposes, are evaluated with respect to compliance with MRRs.

7.1 Introduction

During 2010, recycled water was used for irrigation of Brigantino Riverside Park and Hollister Airport (see Figure 4 and Table 1). Irrigation reuse on parks and landscaped areas is consistent with requirements of Title 22, Division 4, Chapter 3, of the California Code of Regulations. In addition, recycled water was used for crop irrigation on a small, short-term pilot project implemented by the San Benito County Water District (SBCWD) during the summer growing season. The SBCWD pilot project is discussed separately.

TABLE 1
Recycled Water Use Areas (see Figure 4 for locations)

Site	Irrigated Acres	Crop
Brigantino Park	45	Turfgrass
Hollister Airport	90	Turfgrass

This section reports information pertaining to the following elements, as required by the MRRs:

- Hydraulic Loading to Reuse Areas

Recycled water flows to Brigantino Park and the Hollister Airport are metered and recorded at a minimum of once per week. Total measured precipitation for 2010 was 15.44 inches (measured at CIMIS #126), which is slightly above average (for additional information see Table 4 of the Nutrient Management Plan [NMP], included as Appendix D). Hydraulic (irrigation) loading rates compared with agronomic requirements (gross irrigation requirements) are presented and discussed below.

- Nutrient Loading to Reuse Areas

The NMP accounts for all sources of nitrogen to each use area to ensure that nitrogen application does not exceed nutritive demand for turfgrass, excessive leaching of nitrogen below the root zone does not occur, and groundwater beneficial uses are supported. The NMP is provided as Appendix D; it was updated to include the Hollister Airport reuse site. Nutrient loading from all sources in 2010 is reported below, and actual nitrogen application is compared with annual turfgrass nitrogen requirements.

- Groundwater Monitoring within Reuse Areas

A Groundwater Monitoring Plan (GMP) was developed in 2009 to evaluate the impact of treated wastewater and recycled water on underlying groundwater, pursuant to requirements of the MRRs. No changes to the GMP were made during 2010.

The recycled water monitoring well network consists of 12 monitoring wells located at the two reuse water irrigation sites, Brigantino Park (Figure 5) and Hollister Municipal Airport (Figure 6). One well was installed by the COH in 2004, and 11 wells were installed in March 2009. See the GMP for details.

The purpose of the well networks (in addition to permitting requirements) is to provide information to assess whether the recycled water irrigation system is impacting local groundwater quality, to support management of the irrigation system operations, and to protect local groundwater resources that provide potable and irrigation water to the COH. Groundwater was collected and analyzed from the wells upgradient and downgradient of the recycled water irrigation areas as required by the MRRs. Baseline groundwater data were collected for the Hollister Airport site in 2009. Appendix A-5 presents the 2010 quarterly water quality testing results for the Hollister Municipal Airport and Brigantino Park and compares results with California MCLs or other relevant regulatory thresholds.

7.1.1 Reclaimed Water Supervisor

The Reclaimed Water Supervisor has continuing responsibility for ensuring that all personnel who work on a reuse site or with the recycled water irrigation system are adequately trained and that the system is properly monitored and maintained. The Reclaimed Water Supervisors for the Brigantino and Airport use areas are identified in Table 2.

TABLE 2
Reclaimed Water Supervisors

Site	Name	Contact Information
Brigantino Park	Marcello Orta	City of Hollister 2690 San Juan/Hollister Road Hollister, California 831-636-4370
Hollister Airport	Mike Chambless, Airport Manager	City of Hollister 2690 San Juan/Hollister Road Hollister, California 831-636-4370

7.2 Brigantino Park

The turfgrass at Brigantino was established and reached maturity in 2009. In 2010, irrigation at the site was conducted from May through September. In response to a request by RWQCB staff, tensiometers were installed in September 2010 to more closely correlate irrigation with moisture depletion in the soil. In addition, a water audit was conducted in 2010 to evaluate distribution uniformity, and the results are reported in Appendix B.

7.2.1 Recycled Water Application: Brigantino Park

The total agronomic irrigation requirement at Brigantino for 2010 was approximately 149 AF (see Table 3). Irrigation applied was 87 AF, which is approximately 59 percent of the agronomic requirement for the year. No over-irrigation occurred. During September, the irrigation applied (24.2 AF) was slightly greater than the monthly gross irrigation requirement (22.2 AF), but this water was stored in the root zone because of the carryover soil moisture deficit from the preceding month.

TABLE 3

Monthly Actual Water Received versus Agronomic Water Requirements for 2010

Brigantino Park Use Area

Month	Net Crop Water Use[a]		Effective Precipitation[b]		Gross Irrigation Requirement[c]			Actual Irrigation Applied[d] (Recycled Water)		
	(in.)	(acre-feet)	(in.)	(acre-feet)	(MG)	(in.)	(acre-feet)	(MG)	(in.)	(acre-feet)
January	1.2	4.5	1.6	6.0	0.0	0.0	0.0	0	0.0	0.0
February	1.7	6.4	1.5	5.7	0.0	0.0	0.0	0	0.0	0.0
March	3.3	12.4	1.2	4.6	3.2	2.6	9.8	0	0.0	0.0
April	3.7	13.8	2.4	9.0	0.0	0.0	0.0	0	0.0	0.0
May	5.1	19.1	0.4	1.6	7.1	5.8	21.9	1.5	1.2	4.6
June	6.4	23.9	0.0	0.0	9.7	8.0	29.9	5.4	4.4	16.6
July	6.0	22.4	0.0	0.0	9.1	7.5	28.0	5.9	4.8	18.0
August	5.6	20.9	0.0	0.0	8.5	7.0	26.2	4.6	3.8	14.1
September	4.7	17.7	0.0	0.0	7.2	5.9	22.2	7.9	6.5	24.2
October	2.9	10.8	0.5	1.9	3.6	3.0	11.1	2.2	1.8	6.9
November	1.8	6.6	1.3	4.9	0.0	0.0	0.0	1.0	0.8	2.9
December	1.0	3.7	1.8	6.8	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	**43.3**	**162**	**10.8**	**41**	**49**	**39.7**	**149**	**28.5**	**23.3**	**87**

Notes:

[a] Reference ET data from CIMIS #126. Net crop water use = reference ET * K_c. Initial K_c was 1.1 to account for higher surface evaporation rates prior to turfgrass establishment.

[b] Precipitation data from CIMIS #126. Effective precipitation (available for root zone storage) assumed 70 percent of measured precipitation.

[c] Gross irrigation requirement accounts for spatial variability and equals the net crop water use divided by an irrigation efficiency of 80 percent (as determined from field tests). Leaching requirement is not included in the reported monthly values.

[d] As measured using a volumetric totalizing flow meter.

7.2.2 Nutrient Management: Brigantino Park

The annual nitrogen requirement for Brigantino in 2010 was approximately 132 pounds per acre (see NMP and Table 4). Nitrogen was applied from three sources: effluent, supplemental fertilizer, and grass clippings left in place. Total nitrogen loading during 2010 was approximately 98 pounds per acre. Applied nitrogen was approximately 74 percent of the annual agronomic demand. Excess nitrogen was not applied.

No nutrient reduction measures are required at this time, because combined nitrogen loading from all sources in 2010 did not exceed agronomic requirements for turfgrass. By conforming to the NMP, excessive nitrogen loading should not occur and groundwater nitrogen levels should not be adversely affected.

TABLE 4

Nitrogen Loading from All Sources and Comparison to Turfgrass Nutrient Requirement

Brigantino Park Use Area

Month	Irrigation Volume Applied (MG)	Total N Concentration in Effluent[a] (mg/L)	N Mass Load from Effluent (lb/acre)
January	0.0		0.0
February	0.0	6.25	0.0
March	0.0		0.0
April	0.0		0.0
May	1.5	4.65	1.3
June	5.4		4.7
July	5.9		6.4
August	4.6	5.9	5.0
September	7.9		8.7
October	2.2		3.7
November	1.0	9	1.6
December	0.0		0.0
Subtotal	**28.5**		**31.4**
N Loading: Effluent			32
N Loading: Supplemental Fertilizer			34
N Loading: Grass Clippings[b]			32
Total Nitrogen Loading			**98**
Agronomic Requirement			**132**
Agronomic Requirement (%)			**74%**

[a]N concentrations are quarterly average concentrations in effluent.

[b]NMP indicates that grass clippings can provide up to ¼ of the total N requirement for turfgrass when not removed with mowing, or approximately 32 pounds per acre.

7.2.3 Groundwater Monitoring: Brigantino Park

Ground water quarterly monitoring results are shown in Appendix A-8.

Four monitoring wells are located on the northern and southern ends of Brigantino Park. These include a single upgradient monitoring well (BMW-1) on the southern side of the park and three downgradient wells on the northern side. BMW-2b was paired with the existing H2A well (a shallower well), and a well pair (BMW-3a and BMW-3b) was installed for sampling the deeper groundwater aquifer (see Figure 5). Quarterly groundwater monitoring is required to comply with the Monitoring and Reporting Program Requirements (Order No. R3-2008-0069). Groundwater monitoring was conducted in accordance with these requirements and with the Groundwater Monitoring Plan.

7.2.3.1 Nutrients in Groundwater

The MRRs require that recycled water use shall not result in an increase in nitrate-N concentration of underlying groundwater above 8 mg/L. Nutrient data relevant to the Brigantino Park reuse area is summarized below in Table 5. Note that while average effluent concentrations are provided for 2010, irrigation did not commence until May.

TABLE 5

Groundwater Nitrogen Impact Evaluation

Brigantino Park Reuse Area

Date	Constituent	DWTP Effluent Concentration (mg/L)	Upgradient Well	Downgradient Wells			
			BMW-1	BMW-2b (deeper)	H2A (shallower)	BMW-3a (shallower)	BMW-3b (deeper)
January 2010	NO_3-N (mg/L)		1	1	7	5	1
	Total N (mg/L)	Q1 average = 6.25	1	2	8	5	1
April 2010	NO_3-N (mg/L)		1	1	8	5	1

TABLE 5
Groundwater Nitrogen Impact Evaluation
Brigantino Park Reuse Area

Date	Constituent	DWTP Effluent Concentration (mg/L)	Upgradient Well	Downgradient Wells			
			BMW-1	BMW-2b (deeper)	H2A (shallower)	BMW-3a (shallower)	BMW-3b (deeper)
	Total N (mg/L)	Q2 average = 4.65	1	1	8	5	1
July 2010	NO_3-N (mg/L)	---	1	1	4	3	1
	Total N (mg/L)	Q3 average = 5.9	2	2	5	4	3
October 2010	NO_3-N (mg/L)	---	1	2	5	4	1
	Total N (mg/L)	Q4 average = 9	3	2	6	5	2

The upgradient groundwater well (BMW-1) had fairly stable nitrate-N concentrations for the year, ranging from 1 mg/ to 3 mg/L. Downgradient wells had slightly higher nitrate-N and total N concentrations (except that nitrogen concentrations measured in Well BMW-3b were very similar to BMW-1), with the highest concentrations measured in Well H2A (January and April). Nitrogen concentrations in shallow wells were higher than in deeper wells for all sampling dates; concentrations were elevated even prior to regular recycled water deliveries to the Brigantino Park reuse site, which began in April 2009. Nitrogen concentration in downgradient groundwater wells did not exceed 8 mg/L NO_3-N in any of the quarterly groundwater sampling events.

The April 2010 nitrate-N concentration measured in Well H2A was higher than the 2009 concentration, but July and October concentrations were lower than 2009 concentrations. Well H2A showed fluctuations in nitrate-N and total nitrogen with higher levels from January to April. In April 2010, nitrate-N was measured at 8 mg/L; however, recycled water irrigation did not occur in April and was not likely responsible for the nitrogen concentration that was measured at this location. Other downgradient wells showed slight fluctuations in groundwater nitrogen over the year that do not appear to be related to irrigation at the site. Total N applied to the site from all sources was less than the 2010 agronomic demand; therefore, irrigation with recycled water would be unlikely to contribute substantial nitrogen to underlying groundwater at the Brigantino use area.

7.2.3.2 Other Constituents in Groundwater

The following parameters were identified above a primary or secondary MCL or other regulatory threshold (data are provided in Appendix A):

- **Sodium (Basin Plan groundwater quality objective = 200 mg/L).** Wells H2A, BMW-3a, and BMW-3b had levels that exceeded the threshold value in January 2010, before irrigation started. Wells H2A, BMW-2b, BMW-3a, and BMW-3b exceeded the threshold in April and October 2010. Wells BMW-2b, BMW-3a, and BMW-3b exceeded the threshold in July 2010. Comparing these values to 2009 data, it appears that sodium concentrations are generally higher in 2010 than in 2009. Particularly, four wells exceeded the threshold in October 2010 compared with only one well in October 2009.

- **Boron (Basin Plan groundwater quality objective = 1 mg/L).** Wells BMW-3a and BMW-3b slightly exceeded the median groundwater quality objective in January, April, July, and October 2010. There was a similar exceedance in groundwater at BMW-3b in 2009. Boron concentration in DWTP effluent ranged from 0.7 to 1.0 mg/L during 2010, which is similar to concentrations typically observed in groundwater in the vicinity. Thus, there is no evidence that irrigation with recycled water is affecting underlying groundwater at the Brigantino site.

- **Sulfate (secondary MCL recommended concentration of 250 mg/L, upper 500 mg/L, and short term of 600 mg/L).** Values were above the secondary MCL in BMW-1 and values were above all limits in BMW-3a and BMW-3b in January 2010. Wells H-2A, BMW-1, BMW-2b, BMW-3a, and BMW-3b were above the secondary lower limit MCL with one well (BMW-3b) above all limits in April 2010. Wells H-2A, BMW-1, BMW-3a, and BMW-3b were above the secondary lower limit MCL with one well (BMW-3b) above the upper limit in July 2010. Sulfate values exceeded the secondary MCL in wells BMW-1. BMW-3a, and BMW-3b and only one well (BMW-3b) exceeded all limits in October 2010. Given that sulfate values in the upgradient well BMW-1 exceeded the secondary MCL limits for all sampling events, it can be inferred that sulfate levels are naturally high in the background water (above lower-level secondary MCL).

- **Chloride (Basin Plan groundwater quality objective of 150 mg/L).** Chloride values exceeded the threshold level for all the wells in January, April, July, and October, which is consistent with 2009 observations (except for BMW-2b).

- **TDS (Basin Plan groundwater quality objective [median] of 1,200 mg/L).** The quarterly test results showed that all the installed wells (shallower and deeper) had TDS levels exceeding the median threshold, with the exception of BMW-2b in January 2010. Wells H-2A, BMW-3a, and BMW-3b show TDS levels exceeding the median threshold in April and July 2010. All wells except BMW-2b were above the threshold in October 2010. These results are similar to those from 2009.

- **Specific Conductance or Conductivity (recommended secondary MCL of 900 microSiemens per centimeter [µS/cm], upper 1600 µS/cm and short term 2,200 µS/cm).** All the wells had conductivity values that exceeded the lower and upper limit MCL, with well BMW-3b above the short-term limit in January 2010. Conductivity was not measured in April, July, or October 2010 because it is required as an annual testing parameter for the MRR. These results agree with what was reported in 2009 and parallel the results observed for TDS.

- **Perchlorate (MCL of 0.006 mg/L).** Perchlorate was detected above the MCL in well BMW-3a in July and in well H-2A in October 2010; perchlorate was non-detectable in all the other wells. Operations from the previous Whittaker Ordnance Facility, located west of Brigantino Park, resulted in historical perchlorate contamination. It is possible that perchlorate is migrating from this source into the groundwater at Brigantino Park. Further testing may be necessary to make a definitive determination.

Appendix A-5 presents the groundwater quality testing results for 2010 and provides summary statistics for groundwater monitoring.

7.3 Hollister Airport

The Hollister Airport irrigation system was installed in 2009; during 2009 limited discharges of recycled water occurred for testing purposes. Turfgrass was seeded in late August 2010; earlier in 2010, the site was prepared for seeding, and limited recycled water applications were made to prepare the site for planting.

7.3.1 Recycled Water Application: Hollister Airport

Recycled water flows to the Hollister Airport are metered and recorded on a daily basis. Table 6 shows the amount of water distributed to the Hollister Airport, compared with the agronomic requirement under average-year conditions. The total measured precipitation of 15.44 inches (measured at CIMIS #126) is slightly above average (for additional information, see Table 4 of the Nutrient Management Plan [NMP], included as Appendix D), so slightly less irrigation water would be required to support a healthy turfgrass stand, compared with average year conditions.

Turfgrass was seeded at the Airport Reuse Site during August 2010. Pre-plant irrigation occurred before seeding. Pre-plant irrigations were required to work the soil in preparation for planting. After seeding, a moist soil surface is required for germination and establishment. Frequent irrigations were required during the first two months in particular (August and September) to keep the soil surface moist. Frequent irrigations and emerging turfgrass led to high evaporation losses from the soil surface before the grass was fully established. The grass was considered fully established in approximately November 2010.

The total agronomic irrigation requirement at the Airport Reuse Site for 2010 was approximately 127 AF. Irrigation applied was 104 AF, which is approximately 82 percent of the agronomic requirement for the year. During September, the irrigation applied (78.6 AF) was greater than the monthly gross irrigation requirement (51.4 AF). However, the combined irrigation applied for August and September was 85.1 AF, compared with an agronomic requirement of approximately 112 AF. Furthermore, the agronomic requirement for October was approximately 19.3 AF when no irrigation was applied. Deep percolation that may have occurred in September contributed to the agronomic leaching requirement. The leaching fraction for Bermuda grass is approximately 5 percent, equating to approximately 2 inches annually.

TABLE 6

Monthly Actual Water Received versus Agronomic Water Requirements for 2010

Hollister Airport Use Area

	Net Crop Water Use[a]		Effective Precipitation[b]		Gross Irrigation Requirement[c]			Actual Irrigation Applied[d] (Recycled Water)		
Month	**(in.)**	**(acre-feet)**	**(in.)**	**(acre-feet)**	**(MG)**	**(in.)**	**(acre-feet)**	**(MG)**	**(in.)**	**(acre-feet)**
January	0.0	-	1.6	6.0	0.0	0.0	0.0	0	0.0	0.0

TABLE 6

Monthly Actual Water Received versus Agronomic Water Requirements for 2010

Hollister Airport Use Area

Month	Net Crop Water Use[a]		Effective Precipitation[b]		Gross Irrigation Requirement[c]			Actual Irrigation Applied[d] (Recycled Water)		
	(in.)	(acre-feet)	(in.)	(acre-feet)	(MG)	(in.)	(acre-feet)	(MG)	(in.)	(acre-feet)
February	0.0	-	1.5	5.7	0.0	0.0	0.0	0	0.0	0.0
March	0.0	-	1.2	4.6	0.0	0.0	0.0	0	0.0	0.0
April	0.0	-	2.4	9.0	0.0	0.0	0.0	0	0.0	0.0
May	0.0	-	0.4	1.6	0.0	0.0	0.0	0.06	0.0	0.2
June	0.0	-	0.0	0.0	0.0	0.0	0.0	0.65	0.3	2.0
July	0.0	-	0.0	0.0	0.0	0.0	0.0	5.33	2.2	16.4
August	6.5	48.5	0.0	0.0	19.8	8.1	60.6	2.11	0.9	6.5
September	5.5	41.1	0.0	0.0	16.7	6.8	51.4	25.61	10.5	78.6
October	2.6	19.3	0.5	1.9	6.3	2.6	19.3	0	0.0	0.0
November	1.6	11.9	1.3	4.9	0.0	0.0	0.0	0	0.0	0.0
December	0.9	6.7	1.8	6.8	0.0	0.0	0.0	0	0.0	0.0
TOTAL	**17.0**	**127**	**10.8**	**41**	**43**	**17.5**	**131**	**33.8**	**13.8**	**104**

TABLE 6

Monthly Actual Water Received versus Agronomic Water Requirements for 2010

Hollister Airport Use Area

	Net Crop Water Use[a]		Effective Precipitation[b]		Gross Irrigation Requirement[c]			Actual Irrigation Applied[d] (Recycled Water)		
Month	**(in.)**	**(acre-feet)**	**(in.)**	**(acre-feet)**	**(MG)**	**(in.)**	**(acre-feet)**	**(MG)**	**(in.)**	**(acre-feet)**

Notes:

[a] Reference ET data from CIMIS #126. Net crop water use = reference ET * Kc. Initial Kc was 1.1 to account for higher surface evaporation rates prior to turfgrass establishment.

[b] Precipitation data from CIMIS #126. Effective precipitation (available for root zone storage) assumed 70% of measured precipitation.

[c] Gross irrigation requirement accounts for spatial variability and equals the net crop water use divided by an irrigation efficiency of 80%. Leaching requirement is not included in the reported monthly values.

[d] As measured using a volumetric totalizing flow meter.

7.3.2 Nutrient Management: Hollister Airport

Results in Table 7 show that annual nutrient loading is generally consistent with agronomic requirements. The agronomic nitrogen requirement for the Hollister Airport in 2010 was approximately 66 pounds per acre. Once fully established, the annual nitrogen demand is expected to be approximately 150 pounds per acre. Nitrogen was applied from three sources: effluent, supplemental fertilizer, and grass clippings left in place. Supplemental fertilizer was applied in two applications totaling approximately 42 pounds per acre. Total nitrogen loading was approximately 64 pounds per acre. Applied nitrogen was approximately 97 percent of the agronomic demand. Excess nitrogen was not applied.

No nutrient reduction measures are required at this time, because combined nitrogen loading from all sources in 2010 did not exceed agronomic requirements for turfgrass. By conforming to the NMP, excessive nitrogen loading should not occur, and groundwater nitrogen levels should not be adversely affected.

TABLE 7

Nitrogen Loading from All Sources and Comparison to Turfgrass Nutrient Requirement

Hollister Airport Use Area

Month	Irrigation Applied (MG)	Total N Concentration* (mg/L)	N Mass Load: Effluent (lb/acre)
January	0.0		0.0
February	0.0	6.25	0.0
March	0.0		0.0
April	0.0		0.0
May	0.1	4.65	0.0
June	0.7		0.3
July	5.3		2.9
August	2.1	5.9	1.2
September	25.6		14.0
October	0.0		0.0
November	0.0	9	0.0
December	0.0		0.0
Subtotal	**33.8**		**18.4**
N Loading by Effluent			18
N Loading by Supplemental Fertilizer			42
N Loading by Grass Clippings			4
Total Nitrogen Loading			**64**
Agronomic Requirement			**66**
Agronomic Requirement (%)			**97%**

*N concentrations are from quarterly effluent sampling. The average quarterly effluent N concentration was used to determine monthly N loading, respectively.

Note:

NMP indicates that grass clippings can provide up to ¼ of the total N requirement for turfgrass when not removed with mowing, or approximately 33 pounds per acre.

7.3.3 Groundwater Monitoring: Hollister Airport

Ground water quarterly monitoring results are shown in Appendix A-8.

Eight monitoring wells were installed on the northern and southern sides of the Hollister Municipal Airport property in 2009 (see Figure 6). Wells AMW-1a and AMW-1b were installed to monitor the upgradient groundwater (“a” denotes the shallower and “b” denotes the deeper well). Well numbers AMW-4a, AMW-4b, AMW-5a, and AMW-5b were installed for the downgradient monitoring points. Groundwater generally flows in a northwesterly direction;

AMW-2 and AMW-3 were installed to provide information to assess the lateral migration of constituents in groundwater. Groundwater quality is measured quarterly to comply with the Monitoring and Reporting Program Requirements (Order No. R3-2008-0069), and groundwater monitoring was conducted in accordance with these requirements and with the Groundwater Monitoring Plan.

7.3.3.1 Nutrients in Groundwater

The MRRs require that recycled water use shall not result in an increase in nitrate-N concentration of underlying groundwater above 8 mg/L. Nutrient data relevant to the Hollister Airport reuse area is summarized below in Table 8.

Test results for the January, April, July, and October sampling events show that pre-existing elevated levels of nitrate and total nitrogen are in the groundwater in the shallower and deeper upgradient wells (AMW-1a and AMW-1b). This observation is true for both the 2009 and the 2010 monitoring data. The upgradient wells exceeded the threshold throughout the year, while none of the downgradient wells exceeded the threshold in 2010.

Total N applied to the site from all sources was generally consistent with agronomic requirements; therefore, irrigation with recycled water would be unlikely to contribute to an increase in nitrate-N or total N in underlying groundwater at the Hollister Airport reuse area.

7.3.3.2 Other Constituents in Groundwater

The following testing parameters were measured at concentrations above a primary or secondary MCL or other regulatory threshold:

- **Sodium (Basin Plan groundwater quality objective = 200 mg/L).** All the wells with the exception of upgradient shallow well AMW-1a, which was dry, exceeded the median groundwater objective level in January 2010. All wells were above the median groundwater objective level in April, July, and October 2010, which is consistent with 2009 observations.

- **Boron (Basin Plan groundwater quality objective = 1 mg/L).** Boron levels exceeded the median groundwater objective for most of the wells, including upgradient wells in January, April, July, and October, indicating that pre-existing high levels of boron are in the groundwater underlying the Airport.

TABLE 8

Groundwater Nitrogen Impact Evaluation

Hollister Airport Reuse Area

			Upgradient Wells		Downgradient Wells					
Date	Constituent	DWTP Effluent	AMW-1a (shallower)	AMW-1b (deeper)	AMW-2 (lateral)	AMW-3 (lateral)	AMW-4a (shallower)	AMW-4b (deeper)	AMW-5a (shallower)	AMW-5b (deeper)
January 2010	NO_3-N (mg/L)		Dry	23	3	No data	ND	1	3	3
	Total N (mg/L)	Q1 avg = 6.25	Dry	23	4	No data	1	2	4	4
April 2010	NO_3-N (mg/L)		19	36	8	No data	1	4	1	1
	Total N (mg/L)	Q2 avg = 4.65	19	36	8	No data	2	5	2	2
July 2010	NO_3-N (mg/L)	---	19	34	No data	7	1	1	1	1
	Total N (mg/L)	Q3 avg = 5.9	19	33.7	No data	8	2	2	2	2
October 2010	NO_3-N (mg/L)	---	18	38	3	7	1	2	1	1
	Total N (mg/L)	Q4 avg = 9	18	38	4	7	2	3	2	2

- **Chloride (threshold of 150 mg/L).** Most wells exceeded the threshold in the January, April, July, and October 2010 sampling events, which is consistent with 2009 observations.
- **Sulfate (recommended secondary MCL of 250 mg/L, upper 500 mg/L, and short-term of 600 mg/L).** All wells, with the exception of AMW-1a, because it was dry, had levels above the secondary MCL with all but AMW-1b above the upper MCL in January 2010. All wells were above the recommended secondary MCL with all but AMW-4a and AMW-5a above the upper limit in April 2010. All but one well (AMW-1a) were above the recommended secondary MCL with three wells (AMW-1b, AMW-3, and AMW-4b) above the upper limit in July 2010. All wells were above the recommended secondary limit, and the majority of wells were over the upper limit in October 2010. All wells showed substantially elevated sulfate in 2009, as well, indicating that pre-existing high sulfate is in groundwater underlying the Airport.

- **TDS (threshold of 1,200 mg/L).** The quarterly test results showed that all the installed wells (shallower and deeper) had levels of TDS that exceed the median groundwater objective threshold, with the exception of AMW-4a in January and AMW-5a in July, which is similar to observations in 2009.
- **Specific conductance or conductivity (recommended secondary MCL of 900 µS/cm; upper 1,600 µS/cm; and short term 2,200 uS/cm).** All the wells had conductivity values that exceeded the recommended MCL and were measured in January 2010. The same was reported for the 2009 values.

Appendix A-5 presents the groundwater quality testing results for 2010 and provides summary statistics for groundwater monitoring.

7.4 Use Area Inspections

7.4.1 Reuse Site Inspections

During 2010, when recycled water was applied to Brigantino Park and Hollister Airport, inspections occurred to verify compliance with the MRRs (inspection documentation available at COH). Visual inspections documented the following:

- Proper sprinkler operation
- Runoff
- Ponding or saturated surface conditions
- Erosion
- Odors

No use of recycled water occurred during periods of rainfall.

7.4.2 Irrigation System Inspections

The COH inspected the operation of the Brigantino Park and Hollister Airport irrigation system quarterly to verify that the site was operated in accordance with statewide reclamation criteria. Sprinkler clogging from an unidentified source continued to be a problem at Brigantino in 2010, but clogging decreased through the season. The screen in the inlet strainer was changed to a smaller mesh size, and broken sprinkler lines were repaired.

A water audit/field investigation of the Brigantino site was conducted and is provided in Appendix B. Results of the water audit documented problems with filter clogging, improperly adjusted sprinklers, excessive water pressure, incomplete sprinkler coverage, a faulty valve at one station, and a need to improve distribution uniformity. All problems that were identified are being corrected by COH.

7.5 Annual Cross-Connection Testing

The COH implements a Cross-Connection Certification to protect the public water supply system. The certification procedures are reviewed and updated annually, as necessary. The COH, in coordination with DPH, performed and documented a cross-connection test prior to recycled water irrigation at each reuse site. Testing was performed by appropriately certified individuals. Cross-Connection Certifications for the Brigantino and Hollister Airport use areas were provided with the 2009 Annual Report.

7.5.1 San Benito County Water District: Agricultural Pilot Project

During summer 2010, San Benito County Water District (SBCWD) implemented a seasonal pilot study to evaluate the agricultural use of recycled water on representative annual crops (e.g., peppers, tomatoes, lettuce, and beans) during the summer growing season. The pilot project was located on a 20-acre parcel adjacent to the City's 20-inch reclaimed water distribution line corridor between the DWTP and the Hollister Airport. The test plots located within the 20-acre site included a 2.5-acre experiment plot irrigated with reclaimed water and a 4-acre combination overspray buffer and irrigation control plot surrounding the experiment plot. The remainder of the 20-acre parcel was cultivated and irrigated conventionally by the property occupant.

The project consisted of growing summer crops as a demonstration; the crops were irrigated using only COH recycled water via conventional spray irrigation and drip irrigation. Crops irrigated with reclaimed water were not harvested and were tilled into the site upon completion of the growing cycle(s). See Appendix F-1 for the test plot location, and see Appendix F-2 for test plot configuration. No herbicides or fertilizers were used. Only hand removal was used to control any weeds.

Irrigation water was supplied using properly marked (as reclaimed water) conventional agricultural aluminum irrigation lines supplying water to conventional 7/64-inch-orifice ag-sprinklers for beans and lettuce. Drip irrigation consisted of 7/8-inch low-flow drip-tape for tomatoes and peppers. The system connected to the COH 20-inch-diameter mainline on the southwesterly property boundary, and a 6-inch line extension was installed. Regular irrigation consisted of 1- to 2-hour sets, 3 days per week from mid-May to late-October, with no irrigation on the days after it had recently rained.

A separation buffer of 100 feet with containment features was placed around the experiment plot to ensure that over-spray and irrigation drainage into conventionally irrigated crops and domestic residences would not occur. Setbacks of 100 feet were maintained between nearby domestic wells. Irrigation systems for the pilot project were separate systems with no co-mingling of components and appurtenances.

Water quality monitoring consisted of weekly sampling and analysis for general minerals (physical and inorganic), pathogens (total coliform, *E. coli*, 0157-H7 *E. coli*, *Salmonella, Shigella, Clostridium*), and free chlorine residual for the length of the growing season. Pre- and post-project soil analyses were conducted for conventional constituents (including physical and inorganic, total N, total Kjeldahl nitrogen [TKN], ammonia nitrogen [NH_4-N], and phosphate [PO_4]) and pathogens (see aforementioned list). All analytical results are provided in Appendix F-3.

The COH was the responsible party for recycled water use during implementation of the pilot project. CCRWQCB and CDPH were notified prior to implementation of the project (see Appendix F-4 for correspondence). SBCWD staff were provided with recycled water Rules of Use and were properly trained by the Reuse Area Supervisor prior to initiating implementation of the project. Cross-connection testing was performed, and results are provided in Appendix F-5.

7.5.2 Recycled Water Application: SBCWD Pilot Project

Deliveries of recycled water to the pilot project were metered daily, and flows are documented in Appendix F-3. Irrigation was scheduled based on crop ET requirements, as determined from regular downloading of daily ET information from the local CIMIS station. Actual irrigation volumes were often less than agronomic requirements, as estimated from CIMIS information. See Appendix F-6 for water budget information prepared by SBCWD.

7.5.3 Nutrient Loading: SBCWD Pilot Project

No supplemental fertilizer was applied during implementation of the pilot project, and the only source of nitrogen to crops was from treated wastewater supplied by the COH DWTP. Approximately 6 lbs total N per acre was received during project implementation, assuming 2.5 acres of irrigated crops. All applied nitrogen is assumed to have been utilized by crops. Because excessive nitrogen was not applied and hydraulic loading was consistent with the agronomic demand, there was no potential for adverse effects to groundwater.

7.5.4 Salt Loading: SBCWD Pilot Project

Irrigation using recycled water for implementation of the pilot project contributed a nominal amount of salt loading to soils. Based on irrigation volumes from July through October and TDS concentrations reported for DWTP effluent, a total salt loading of approximately 3 tons would have occurred (see Table 11).

7.5.4.1 Groundwater Monitoring:SBCWD Pilot Project

Groundwater monitoring well locations are shown in Appendix F-2. Well GW-1 is upgradient of the project site, GW-2 is a control well that was used for irrigation of the control plot, and GW-3 is downgradient of the project site. Baseline groundwater monitoring conducted in June 2010, prior to project implementation, revealed pre-existing elevated TDS concentrations. In June 2010, TDS concentration in groundwater from the upgradient well (GW-1) was over 2,000 mg/L and was over 1,500 mg/L in the downgradient well (GW-3). In October 2010, at the completion of the project, TDS concentration in groundwater from the upgradient well (GW-1) was over 2,000 mg/L, while it was approximately 1,400 mg/L in the downgradient well. TDS concentration in groundwater from the downgradient well did not increase during project implementation; thus, the project did not have an adverse effect on salinity in groundwater.

The baseline level of total nitrogen in the upgradient well (GW-1) was approximately 30 mg/L, higher than the drinking water MCL (10 mg/L); and the baseline nitrogen level in the downgradient well was over 14 mg/L. In July when the project was initiated, nitrogen in the downgradient well was measured at nearly 48 mg/L, while nitrogen concentrations in the upgradient and control wells remained fairly similar to baseline concentrations. At completion of the project in October 2010, nitrogen concentrations in the upgradient and control wells increased to 36 and 32 mg/L, respectively, while the nitrogen concentration in the downgradient well was measured at 11 mg/L, far lower than the July 2010 sampling event and lower than the baseline condition. Thus, while groundwater nitrogen concentrations fluctuate over time near the pilot project, there is no evidence that the pilot project had any effect on groundwater nutrient levels.

SECTION 8

Long-Term Salinity Management

The COH is implementing a Long-Term Salinity Management Program (LTSMP) in cooperation with other water agencies in the San Benito River watershed, including the SBCWD, Sunnyslope County Water District (SSCWD), and County of San Benito (SBC). The purpose of the LTSMP is to document salt loading and to evaluate and set forth a plan to implement salt loading reduction measures as outlined in the March 2007 Report of Waste Discharge (ROWD). Salt reduction measures focus on all potential salt contributions from the water supply, residential, commercial, and industrial uses, as applicable, prior to disposal. The LTSMP specifies milestones necessary to achieve reductions in effluent TDS concentrations in accordance with the Long Term Wastewater Management Plan and Hollister Urban Area Water and Wastewater Master Plan (i.e., approximately 700 mg/L TDS by the year 2015).

8.1 Annual Salt Loading

8.1.1 Overall Groundwater Basin

The SBCWD is responsible for monitoring overall salt loading to the groundwater basins in the county. The SBCWD produces an annual groundwater report with its primary purpose to monitor groundwater supplies and withdrawals. Every third year, this report provides groundwater quality data and analysis. The last report to address groundwater quality was for the 2010 water year and was published in January 2011. For the 2010 Annual Report, TDS, nitrate, and chloride were selected as the key constituents of concern. These three constituents vary over time and space in the basin and indicate general trends in basin water quality.

Table 10 (taken from the Water District's 2010 Annual Groundwater Report) shows the average conditions for each subbasin for the key constituents, TDS, nitrate, and chloride. The values were developed by averaging all drinking water and ambient monitoring events that occurred from 2007 to 2010; water quality samples from regulated facilities were not included in the analysis. These average conditions serve as a snapshot for each subbasin and allow a simple comparison of water quality conditions across the basin. The Hollister Domestic Water Reclamation Plant is located in the San Juan subbasin. The Brigantino Park Reuse Site and the Hollister Industrial

Wastewater Treatment Plant are located in the Hollister West subbasin. The Hollister Airport Reuse Site is located in the Bolsa SE subbasin.

TABLE 10
Average Constituent Concentrations (by subbasin)

Subbasin	Total Dissolved Solids (TDS)	Nitrate (as NO3)	Chloride
Bolsa	413	29	52
Bolsa SE	NA	27	NA
Hollister East	1,065	36	172
Hollister West	948	33	148
Pacheco	589	18	117
San Juan	1,450	45	267
Tres Pinos	863	17	193

Note:
Table is from SBCWD 2010 Annual Groundwater Report.

TDS concentrations in all but two of the District's monitoring wells have shown either no trend or a slightly decreasing trend in concentrations over recent years. TDS concentrations are affected by both natural and anthropogenic sources. Wells downstream of the old wastewater treatment ponds near Highway 156 in the San Juan subbasin show a decrease in concentrations, possibly because of the reduced percolation of wastewater in recent years.

Nitrate (NO_3) is a common constituent and has often been identified as a constituent of concern in the basin. As the source of nitrate is usually anthropogenic through fertilizer application or wastewater disposal on the ground surface, groundwater closer to the groundwater surface will contain higher concentrations. The highest recent concentrations occurred in shallow wells in the eastern San Juan subbasin. Nitrate concentrations were either steady or increasing in half of the District's monitoring network. Increasing conditions were observed in all areas of the basin. Concentrations in the basin are highly variable and may reflect local variations in land use, waste disposal, and agricultural irrigation return flows.

Chloride is a common salt in the basin, and its presence is the result of both natural and anthropogenic sources. Chloride concentrations in the basin are variable. An equal number of wells monitored by the District show increasing and decreasing concentrations. Concentrations tend to be decreasing in the areas downgradient from the old wastewater percolation ponds and increasing closer to urban areas.

8.1.2 Salt Loading to Application Areas

Mass loading of TDS, sodium, chloride, and boron to each area receiving recycled water (i.e., unlined storage ponds at the treatment plants, Brigantino Park, Hollister Airport, and SBCWD Pilot Project) was calculated. Results for use areas are shown graphically in Figure 7.1, 7.2, and 7.3, and a salinity mass balance is provided in Table 11. Total mass load of TDS in effluent from the DWTP and IWTP that was delivered to storage ponds and reuse areas was 4334 tons, and the majority of salt loading was to the domestic ponds.

8.2 Analysis of Groundwater Monitoring Data for Salt Constituents

Use area groundwater monitoring results for TDS, sodium, chloride, sulfate, and boron are discussed in Section 7.2.3 and 7.3.3, for Brigantino Park and Hollister Airport, respectively. Concentrations of salinity constituents in groundwater associated with DWTP ponds are provided in Table 9.

8.2.1 Evaluation of Potential Impacts of Salt Loading on the Groundwater Basin

In 2010, the potential impacts of salt loading on the groundwater basin would be limited to percolation of effluent in the DWTP and IWTP ponds and irrigation of recycled water at the reuse areas. At the DWTP, the TDS concentration in the underlying groundwater averaged 1,025 mg/L during 2010 and ranged from an annual average of 334 mg/L at MW-4 to an annual average of 1,534 mg/L at Well 03-1S (see Appendix A-5a). The concentration of TDS in the DWTP effluent averaged 1,021 mg/L in 2010. Because the maximum TDS concentration in groundwater underlying the DWTP percolation ponds is substantially greater than the average TDS concentration in domestic effluent, no significant impact due to percolation from domestic ponds on the groundwater basin would be expected.

Groundwater in the vicinity is naturally high in TDS from mineralization occurring upgradient in the San Benito River Valley sediments. At the IWTP, the TDS concentration in the underlying groundwater averaged 1,042 mg/L in 2010, while the IWTP effluent averaged 1,671 mg/L. These values are similar to concentrations measured in 2009 for IWTP effluent and groundwater. Because TDS concentrations in underlying groundwater at the IWTP are similar to TDS concentrations generally found in nearby groundwater and are similar to concentrations measured in 2009, there is no evidence that the IWTP ponds contributed to an increase in groundwater TDS in 2010.

At the Brigantino Riverside Park recycled water use area, the average TDS concentration of the underlying shallow groundwater during 2010 was about 1,293 mg/L, while the TDS concentration in the recycled water (DWTP effluent) averaged 1,021 mg/L. In 2009, underlying shallow groundwater at Brigantino had average TDS of 1,263 mg/L, while TDS in domestic effluent averaged 1,119 mg/L. TDS in domestic effluent was slightly lower in 2010 compared with 2009, and TDS in shallow groundwater at Brigantino Park was similar between 2010 and 2009. Therefore, no significant impact occurred on the groundwater salinity due to irrigation at the recycled water use area in 2010. Because TDS in effluent is generally lower than underlying groundwater in the basin, application of recycled water would potentially provide a net positive benefit to groundwater quality.

At the Hollister Airport recycled water use area, the average TDS concentration of underlying shallow groundwater in 2010 averaged 1,286 mg/L, while the 2009 average concentration was 2,370 mg/L. In 2009, one TDS measurement at the AMW-4a well was unusually high and resulted in an average TDS concentration that was much higher than the 2010 average concentration. The TDS concentration in DWTP effluent is less than that of underlying groundwater at the Hollister Airport, and application of recycled water at the Airport site would potentially provide a net positive benefit to groundwater quality.

8.3 Salt Reduction Measures

The COH is an active member of the Water Resources Association of San Benito County (WRA). The WRA is responsible for the salinity management programs in the basin, including salt reduction measures.

8.3.1 Water Softener Ordinance

In cooperation with the WRA, the COH has drafted a water softener ordinance to comply with California Health and Safety Code 116786. In 2010, the ordinance was revised to incorporate some of the more stringent restrictions that recently enacted state legislation, Senate Bill 7 allows. The ordinance is currently under final review by the Hollister City Attorney, as the City has been working with the Sunnyslope Water District to make sure that their respective ordinances are coordinated and do not conflict. The ordinance will prohibit the installation of self-regenerating water softeners on new construction. The COH is working through the public outreach process (see below) to require replacement upon home sale.

8.3.2 Water Softener Replacement Rebate Program

The COH also participates in the Water Softener Rebate Program, which provides an incentive to homeowners to upgrade, replace, or remove pre-1999 water softeners. The cash incentive provides $150 to upgrade to new low-salt technology, $250 to replace with a unit that does not self-regenerate, or $300 to remove the water softener altogether. A total of 377 rebates have been processed so far with the program.

8.3.2.1 Public Outreach and Education

The COH continues to participate in the salinity education program geared to homeowners, industry, and agriculture. For homeowners, home water surveys are conducted each year; 292 were conducted in 2010. As part of this survey, residents are educated on the proper use and maintenance of water softeners and are encouraged to participate in the rebate program.

Special water use efficiency classes are given to agricultural and residential customers that include salinity management in the curriculum. The classes are taught by California State Polytechnic University at San Luis Obispo. The class for residential gardening occurred in 2010, and the class for agricultural irrigation is scheduled for early 2011.

In 2010, public outreach and education on salinity control, including water softeners, was also provided in other areas as follows:

- Two newsletters were distributed by the WRA to all water customers in the region.
- Booths were set up at the County Fair, the Farmers Market (twice in 2010), and the Spotlight on San Benito County Job Fair and Trade Expo.
- Articles were published in local newspapers and other publications, including the Hollister Freelance, Hollister Pinnacle, and Out & About.
- Appearances were made on the local cable access channel that reaches 8,000 viewers.
- Guest lectures were given at four local grade school classes.

- Inserts were included in customers' water bills.

8.3.2.2 Salt Reduction Measures for Industrial Customers

In an effort to reduce sodium levels in the IWTP influent, San Benito Foods (tomato processing) converted from sodium hydroxide (NaOH) to potassium hydroxide (KOH) for tomato peeling. While the levels of sodium decreased, the levels of chloride increased. San Benito Foods was not able to continue to reliably obtain KOH, so it was forced to return to NaOH. As a result, sodium levels increased but chloride levels have decreased.

Ozeki Foods (a saki producer) upgraded its water softening process to new closed-circuit technology. This new technology minimizes salt loading to the wastewater discharge by regenerating only on an as-needed basis rather than on a timed cycle.

8.3.2.3 Recommendations and Time Schedules for Implementation of Proposed Salt Reduction Measures

The Hollister Urban Area Water and Wastewater Master Plan (Master Plan) set forth recommendations and time schedules of a basin-wide demineralization program aimed at potable water supply wells that will reduce salinity in the recycled water produced by the COH Domestic Water Reclamation Plant. The Master Plan was first released in 2007 and was updated in January 2010. The updated Master Plan reaffirms the recommended goal to reduce recycled water salinity to approximately 700 mg/L TDS by the Year 2015. Because of the economic downturn and the need to minimize capital expenditures and water rate increases, development of local water supplies is the first priority to increase water supply and to improve water quality for the region. Thereafter, a demineralization program is planned for potable water supply wells to reduce recycled water salinity. The first phase of the program is planned to be wellhead treatment of the COH's Well #1 near the airport. The recommended timeline is for 3 MGD of demineralization capacity by 2015 and an additional 2 MGD by 2019, for a total of 5 MGD through the year 2023. Brine disposal options are being evaluated and include evaporation ponds, deep well injection, and brackish wetland natural treatment systems.

TABLE 11

Salt Mass Loading in Recycled Water Application Areas

	TDS LOADS										
	DWTP Effluent		IWTP Effluent		Total Effluent Produced	DWTP Ponds	IWTP Ponds	Brigantino	Airport	SBCWD Pilot Project	Total Effluent Distributed
Month	mg/L	tons	mg/L	tons	tons	tons	tons	tons	tons	tons	tons
January	1013	250		0	**250**	250	0	0	0	**0**	**250**
February	810	173		0	**173**	173	0	0	0	**0**	**173**
March	939	225		0	**225**	225	0	0	0	**0**	**225**
April	946	223		0	**223**	223	0	0	0	**0**	**223**
May	999	230		0	**230**	224	0	6	0	**0**	**230**
June	1105	239		0	**239**	211	0	25	3	**0**	**239**
July	1109	252		0	**252**	200	0	27	25	**1**	**252**
August	1171	351	1549	480	**831**	317	480	22	10	**1**	**831**
September	1207	334	1769	522	**855**	164	522	40	129	**1**	**855**
October	1115	327	1696	275	**602**	303	275	10	13	**0**	**602**
November	958	224		0	**224**	220	0	4	0	**0**	**224**
December	880	229		0	**229**	229	0	0	0	**0**	**229**
TOTAL		**3057**		**1277**	**4334**	**2739**	**1277**	**135**	**180**	**3**	**4334**