

**MONTECITO WATER DISTRICT
MEMORANDUM**

SECTION: 5-B

DATE: JULY 15, 2014

TO: BOARD OF DIRECTORS

FROM: ENGINEERING MANAGER

**SUBJECT: WATER SUPPLY RELIABILITY — OVERVIEW OF POTENTIAL
RECYCLED WATER OPPORTUNITIES**

RECOMMENDATION:

For information, discussion and possible action.

DISCUSSION:

Staff from the Montecito Water District (MWD) and Montecito Sanitary District (MSD) have been working together to explore various options for providing recycled water to customers within the MWD service boundary. Staff from both Districts are currently working together to generate a detailed report to provide an overview of recycled water options and the various requirements associated with this water supply.

At this time, staff is providing the Montecito Water District Board of Directors with an overview as it relates to the development of a recycled water supply to serve the customers of Montecito. While this memorandum contains information related to recycled water as a supply source for Montecito, further research and analysis is required to fully define any potential projects. For example, staff is waiting for water quality results recently collected from the MSD effluent to evaluate the various constituents that impact recycled water quality and the end use of this potential supply.

PREVIOUS STUDIES

To date, two recycled water planning studies have been performed for the Montecito Water District service area.

- Water Reclamation Study in Montecito, January 1991
- South Coast Recycled Water Development Plan (SCRWDP), 2013

The Water Reclamation Study performed in 1991 was commissioned by both MWD and MSD to examine a limited number of engineering alternatives at a feasibility level of analysis for treating and conveying recycled water.

More recently, the South Coast Recycled Water Development Plan (SCRWDP) was drafted as a part of the Santa Barbara County Integrated Regional Water Management (IRWM) planning process. This plan, which relied upon the previous 1991 study, identifies

the opportunities and constraints of developing recycled water supplies on the south coast, including the Montecito service area. While the 2013 SCRWDP contains updated and relevant information, it is important to note that this report relied heavily upon recycled water customer demand estimates from the 1991 report, which are now significantly lower due to recent rate structure modifications.

AGENCY INVOLVEMENT AND PARTICIPATION

To provide recycled water to the community, full participation and involvement from two separate special districts; Montecito Water District (MWD) and Montecito Sanitary District (MSD) must occur to ensure the success of the overall project.

The development of a recycled water system typically requires coordination and formal agreements between the water and wastewater agencies. Typically, the water agency (MWD) will take the role of “Distributor” with the wastewater agency (MSD) taking the role of “Producer”.

Formal agreements such as a Joint Powers Agreement (JPA) between the agencies must be drafted to clearly define the responsibility of each agency for items such as: engineering, environmental review, permitting, funding, project construction, project operation, ownership of facilities, and operations and maintenance responsibilities, and payment for the costs associated with operating and maintaining the system.

Typical agreements in Santa Barbara County have the Distributor fully funding the recycled water project as well as the ongoing operation and maintenance costs associated with both the production and distribution of the recycled water.

REGULATORY AGENCIES AND GENERAL REQUIREMENTS

There are multiple regulatory entities responsible for ensuring both the protection of natural resources as well as public health as it relates to the production and distribution of recycled water. Below is a brief overview of the permitting agencies and their general requirements.

The State Water Resources Control Board (SWRCB) establishes general policies governing the permitting of recycled water projects consistent with its goal of protecting water quality and sustaining water supplies. The SWRCB adopted Resolution 2009-0011 “Recycled Water Policy” in February 2009 which sets uniform standards and provides direction to the individual Regional Water Quality Control Boards (RWQCB) when implementing recycled water projects. The SWRCB’s “General Waste Discharge Requirements for Recycled Water Use”, Adopted June 3, 2014 stipulates the waste discharge requirements associated with recycled water use.

The Regional Water Quality Control Board (RWQCB) is charged with the protection of surface and groundwater resources and with the issuance and enforcement of permits related to recycled water projects. Although the RWQCB is responsible for the issuance of permits, it must consult with and consider the recommendations of the California Department of Public Health (CDPH) which is charged with the protection of public health

and drinking water supplies and is required to establish uniform statewide recycling criteria for the various uses of recycled water to ensure the protection of public health. These regulations are codified in the California Code of Regulations (CCR) Title 22, Division 4, Chapter 3 “Water Recycling Criteria”. These regulations identify what level of treatment is required depending upon the use of the recycled water.

In addition to complying with the requirements of the RWQCB and the CDPH, the lead agency must also identify any significant environmental impacts related to the project and avoid or mitigate these impacts in accordance with the California Environmental Quality Act (CEQA).

Per Section 60323 of Title 22, prior to producing or supplying recycled water for reuse from a water reclamation plant, an “Engineering Report” shall be prepared by a qualified engineer licensed in California and experienced in the field of wastewater treatment to ensure that the recycled water facility complies with applicable regulations. This report is to be submitted to the RWQCB as well as the CDPH for approval.

In addition, depending on the scope of the project, other public agencies such as the County of Santa Barbara and the California Department of Transportation may become engaged during the planning and permitting phases if infrastructure, such as distribution pipes, requires encroachment into the right-of-way of these agencies.

In general, the next steps required by CDPH and the RWQCB prior to producing or distributing recycled water are as follows;

1. Establish a Joint Powers Agreement or similar agreement between Producer (MSD) and Distributor (MWD) regarding responsibilities as they pertain to recycled water production and distribution.
2. Prepare an “Engineering Report” and submit to CDPH and the RWQCB for review and approval.
3. Submit a Notice of Intent (NOI) to applicable RWQCB and CDPH 90 days prior to project start that includes a Water Recycling Program technical report containing at a minimum the following information;
 - Section I – Facility/Waste Treatment Information
 - Section II – Recycled Water Application
 - Section III – Description of Water Recycling Use Permit Program
 - Section IV – Additional Site Specific Conditions
 - Section V – Water Recycling Program Administration

The NOI is considered incomplete until the CDPH issues a Title 22 Engineering Report approval letter.

The RWQCB will issue Waste Discharge Requirements (WDR’s) for activities that can affect ground water quality. In addition, Water Reclamation Requirements (WRR’s) are issued to place conditions on recycled water use. The RWQCB may issue a Master

Permit to either the Producer (MSD) or Distributor (MWD) or both agencies and will include the requirements for both the WDR's and WRR's.

TYPES OF RECYCLED WATER

Wastewater must be treated to certain levels depending on the intended use of the recycled water. In general, higher levels of treatment are required when the intended use of recycled water is in areas where the public has greater exposure or unrestricted access.

Per Title 22 of the California Code of Regulations there are four types of recycled water, each differentiated by the level of treatment employed. To meet the requirements of Title 22, the wastewater must go through secondary treatment which consists of oxidizing the wastewater to stabilize the organic matter. Advanced wastewater treatment beyond secondary is referred to as tertiary treatment and involves coagulation and media filtration or membrane filtration to meet turbidity criteria.

Below is a brief discussion of the four types of recycled water along a general summary of the acceptable uses for the recycled water produced under each treatment regime.

Un-Disinfected Secondary

Wastewater treated to this level has been oxidized but has not been disinfected.

Per Title 22, recycled water meeting this requirement can be used for surface irrigation for the following:

- Orchards where the recycled water does not come into contact with the edible portion of the crop,
- Vineyards where the recycled water does not come into contact with the edible portion of the crop,
- Non food-bearing trees,
- Fodder and fiber crops and pasture for animals not producing milk for human consumption,
- Seed crops not eaten by humans,
- Food crops that must undergo commercial pathogen-destroying processing before consumption by humans,
- Ornamental nursery stock and sod farms provided no irrigation with recycled water occurs for a period of 14 days prior to harvesting, retail sale, or allowing access by the general public.

Disinfected Secondary 23 Recycled Water

Wastewater treated to this level has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed a most probable number (MPN) of 23 per 100 milliliters utilizing the bacteriological results of the last seven days and does not exceed an MPN of 240 per 100 milliliters in more than one sample in any 30 day period.

Per Title 22, recycled water meeting these requirements can be used for surface irrigation of the following:

- Cemeteries,
- Freeway landscaping,
- Restricted access golf courses,
- Ornamental nursery stock and sod farms where access by the general public is not restricted,
- Pasture for animals producing milk for human consumption,
- Any nonedible vegetation where access is controlled so that the irrigated area cannot be used as if it were a part of a park, playground or school yard.

There are other uses for secondary 23 recycled water such as; source of supply for landscape impoundments that do not utilize decorative fountains, industrial boiler feed, dust control on roads and streets, nonstructural firefighting, soil compaction, mixing concrete, cleaning roads and sidewalks, etc.

Disinfected Secondary 2.2 Recycled Water

Wastewater treated to this level has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed a most probable number (MPN) of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days and does not exceed and MPN of 23 per 100 milliliters in more than one sample in any 30 day period.

Per Title 22, recycled water meeting these requirements can be used for the following purposes:

- Surface irrigation of food crops where the edible portion is produced above ground and not contacted by recycled water.

Wastewater treated to this level can also be used for other purposes such as a source of supply for restricted recreational impoundments and for any publicly accessible impoundments at fish hatcheries.

Disinfected Tertiary Recycled Water

Wastewater treated to this level has been filtered and subsequently disinfected. Typically, conventional treatment trains consist of chemical addition, coagulation, flocculation, filtration and disinfection in a chlorine contact basin to ensure adequate disinfection has occurred. Alternatively, membrane filtration and UV disinfection may be employed to reduce the overall footprint of the on-site treatment facilities.

Per Title 22, recycled water meeting these requirements can be used for the following purposes:

- Food crops, including all edible root crops, where the recycled water comes into contact with the edible portion of the crop,

- Parks and playgrounds,
- School yards,
- Residential landscaping,
- Unrestricted access golf courses.

There are other uses for disinfected tertiary recycled water such as; commercial cooling and air conditioning, decorative fountains, spraying or any other use that creates a mist, structural firefighting, commercial laundries, etc.

Other Uses

Currently, direct potable reuse of recycled water is not permitted by the RWQCB and CDPH. However, CDPH is investigating and reporting to the State Legislature on the feasibility of developing uniform water recycling criteria for direct potable reuse. A final report is due to the Legislature by December 31, 2016.

The State Water Resources Control Board (SWRCB) recycled water policy includes provisions for the recharge of groundwater with recycled water. Approved projects must comply with regulations adopted by the CDPH and must implement monitoring programs for constituents of emerging concern which include a diverse group of chemicals such as pharmaceuticals and personal care products. The RWQCB may also impose monitoring and other requirements for a recharge project depending on local geologic conditions.

EXISTING MSD WASTEWATER TREATMENT FACILITIES

In 1961, MSD constructed a secondary wastewater treatment plant, capable of processing 750,000 gallons per day, including an ocean outfall and trunk sewer system. From 1982 to 1985 significant upgrades occurred that doubled the plant's capacity to 1.5 MGD.

The wastewater treatment plant currently produces disinfected secondary effluent; however this effluent does not meet the Title 22 requirements for recycled water. Specifically, total coliform bacteria in the disinfected effluent is allowed to exceed the most probable number (MPN) of 240 per 100 milliliters in more than one sample in any 30 day period.

MSD and MWD staff are currently evaluating what upgrades and/or modifications would be necessary to meet the requirements for Secondary 23 Recycled Water.

The treatment plant currently has a secondary capacity of 1.5 million gallons per day (MGD). While the plant has a capacity of 1.5 MGD, the average daily flow for 2014 (as of June 26, 2014) is 0.633 MGD. Based on the average daily flow to date for 2014, MSD has an annual effluent flow of approximately 700 AFY.

RECYCLED WATER QUALITY

As previously indicated, Title 22 provides for several uses of recycled water depending upon the level of treatment. It is important to recognize that although recycled water may be treated to various levels and approved for these uses, the water quality may not meet

the requirements of the customer and may necessitate additional treatment or blending of the recycled water with potable water.

Per the previous recycled water study completed in 1991, the MSD wastewater influent was classified as a medium strength domestic wastewater that was found to be generally suitable as a candidate for recycled water with the exception of the total dissolved solids (TDS) content and the chloride concentration.

Both TDS and chloride can have adverse impacts to local agricultural crops such as citrus and avocado and high TDS levels can impact the quality and growth of grass and plants.

In addition to TDS and chlorides, sodium and boron concentrations are also important water quality parameters to consider as these constituents can damage plants. Excessive amounts of chloride, sodium or boron can cause a decrease in production, decrease in growth or cause an undesirable appearance of the plant due to leaf burning.

As previously noted, MSD and MWD are awaiting the results of recent water quality analyses to determine the concentrations of these constituents.

Based on the 1991 study and information reiterated in the 2013 study, it is likely that additional treatment processes (microfiltration and reverse osmosis, etc.) may be required to provide a specified recycled water quality that does not damage plants or crops.

RECYCLED WATER MARKET AND POTENTIAL CUSTOMERS

The recycled water study completed in 1991 examined the potential recycled water market using two main categories; landscape irrigation and agricultural irrigation.

Although there has not been significant development or change in land use in Montecito since the 1991 report was completed, it is important to recognize that the potential recycled water customers previously identified should be re-visited and that the potential for new recycled water customers should be evaluated.

The recycled water demands estimated during the 1991 study must also be carefully scrutinized, as these estimated demands reflected water use before MWD had adopted its tiered water rate structure (Resolution 2047) in August of 2008. The adoption of this new rate structure changed the flat water rate charges to a tiered water rate structure where the cost of water increases with usage.

Below is a comparison of the 1991 estimated recycled water demands compared to MWD potable water sales for FY 2007/08 and FY 2011/12. The FY 2007/08 was selected due to the fact that the District received 102% of average rainfall and had not yet adopted tiered water rates (Resolution 2047). The FY 2011/12 was selected due to the fact that during this period the District received only 59% of average rainfall and had tiered water rates in effect.

As Table 2 indicates, the majority of the previously identified recycled water customers have significantly reduced their overall water demand as compared to the estimated 1991

recycled water demands. In fact, comparison of the 2011/12 FY to the 1991 estimates shows an overall reduction in potential recycled water use of 66%.

Table 2 – Potential Recycled Water Customers

Land Use	Description	Estimated Recycled Water Demand per 1991 Study (AFY)	2007/08 FY Actual Sales (AFY)	2011/12 FY Actual Sales (AFY)
Parks	Lookout Park	7.5	3.0	4.1
	Manning Park	30.0	11.0	9.0
Schools	Westmont College	100.0	71.7	58.0
	Crane Country Day School	20.0	2.5	2.9
	Montecito Union School	7.5	11.2	10.7
	Cold Spring School	10.0	9.2	7.0
	Summerland School	1.5	1.0	1.3
Golf Courses	Valley Club	212.5	123.4	41.3
	Birnam Wood*	187.5	200.8	123.3
Caltrans Greenbelt	Montecito	9	0	0
	Summerland	5.0	2.4	7.9
Cemeteries	Santa Barbara Cemetery	139.0	63.9	36.0
Subtotal: Landscape Irrigation		730	500	302
Agriculture	All Agricultural Accounts	1,457	481	441
Subtotal: Agricultural		1,457	481	441
TOTAL		2,187	981	743

* Includes non-potable well production for 2007/08 and 2011/12 FY sales.

It is important to note that the figures shown for the 2007/08 FY and 2011/12 FY represent total water usage for each user, with no distinction between potable and non-potable requirements. Even if all current demands were to be converted to recycled water, it appears that the total amount of recycled water potential for the entire District is roughly 750 AFY assuming that customer demands for recycled water remain consistent with recent usage patterns.

POTENTIAL RECYCLED WATER SYSTEM NEEDS

NEAR TERM

Staff from MSD and MWD are currently evaluating the existing treatment facilities to determine if it is feasible to provide some level of Title 22 recycled water through the implementation of non-capital intensive methods.

LONG TERM

For long term planning, it is assumed that most recycled water uses would require disinfected tertiary recycled water. Recycled water treated to this level can be used with the fewest restrictions and would allow for the greatest use of recycled water.

Although no detailed engineering analysis has been performed for this report, information obtained from the 2013 South Coast Recycled Water Development Plan indicates that in order to serve potential agricultural users, a microfiltration/reverse osmosis process (MF/RO) would be needed to reduce TDS to acceptable levels, or blending of recycled water with potable water would be required.

While detailed capital costs have not been developed as a part of this report, the 2013 South Coast Recycled Water Development Plan included a rough order of magnitude cost estimate for treatment upgrades. Per the 2013 report, it was estimated that capital costs associated with upgrading the wastewater plant to produce recycled water meeting Title 22 tertiary requirements could cost up to \$7M depending on the treatment process employed and the amount of recycled water produced.

Similar to the discussion above regarding long term upgrades required at the MSD wastewater facility, a significant amount of new infrastructure consisting of distribution pipelines, storage reservoirs and pumping stations would be required to distribute recycled water throughout the MWD service area. While the 2013 South Coast Recycled Water Development Plan included only conceptual level planning and rough order of magnitude cost estimates for the distribution system improvements, it was estimated that the capital costs for these improvements could cost up to \$11M depending on the extent of the recycled water distribution system.

The 1991 study stated, *“By far the most important finding of this study is the economic implication of a strictly landscape irrigation approach to water reclamation. Because landscape irrigation provides a seasonal demand, it is only possible to achieve approximately a 50 percent efficiency in water reclamation production. This fact alone is responsible for increasing the per acre/foot production costs from the \$800 to \$1,200 range up to the \$1,500 to \$2,200 range.”*

The 2013 report, which used the 1991 demand estimates which are much higher than current sales figures, estimated the cost per acre/foot production costs for disinfected tertiary recycled water could range from \$1,700 to \$6,000 depending on the extent of treatment, distribution, pumping and storage facilities. It is important to note that these cost estimates do not include operations and maintenance costs.

LEGAL CONSIDERATIONS

While the State of California supports and encourages recycled water use, there are potential legal implications related to the funding of a recycled water system. As this Board is aware, Proposition 218 applies to the rates and charges assessed to its customers. There is on-going litigation in San Juan Capistrano (Capistrano Taxpayers

Association v. City of San Juan Capistrano (pending in the California Court of Appeal, Fourth District (Orange County)).

While this appeal is still being briefed and will not be argued and decided before the end of the year, it is important that the Board be cognizant of this case and considers the implications as they relate to the funding and assessment of costs of service to customers for such a project. Below are excerpts regarding this on-going litigation.

“In September 2013 the Orange County Superior Court in California handed down an unpublished decision (Capistrano Taxpayers Association v. City of San Juan Capistrano (2013)) that could have public water agencies throwing up their hands in frustration. While it remains to be seen whether the ruling will stand and just how far it may ultimately reach, its potential to further complicate the ability of California water agencies to provide reliable, clean water to communities should motivate decision makers in Sacramento and voters throughout the state to come to their rescue.”

“The second component of the case involved a fee imposed on all water customers to pay for a recycled water system. The agency planned to treat its wastewater to state health code standards and pipe it back to some of its customers for use in landscape irrigation and other non-potable purposes. Proposition 218 requires that a fee is charged only for service that is “actually used by, or immediately available to, the owner of the property...” Because the water recycling system does not distribute that water to every customer, the plaintiffs argued and the court agreed that it was a violation to pass the costs on to everyone. The water utility argued unsuccessfully that it is uneconomical to distribute recycled water to every customer and that all customers do benefit because the use of recycled water by some customers frees up potable water by others. Surprisingly, the court did not agree with that reasoning.¹”

MWD’s Special Counsel, Michael Colantuono, is handling the appeal for San Juan Capistrano and notes that the trial court decision is not a binding authority and that he is optimistic for the appeal. However, it is legally conservative — but perhaps impractical — to fund recycled water supplies only by rates charged to recycled water customers.

Charging potable water customers to develop recycled water supplies is defensible, but involves uncertainty that may be resolved when the San Juan Capistrano case is decided.

CONCLUSION

Establishing a tertiary recycled water system and an extensive distribution system will have significant economic implications. There may be less capital intensive opportunities to provide a lower level of Title 22 recycled water, such as Disinfected 23 Recycled Water, to a limited customer base.

As previously noted, these opportunities are currently being explored by MSD and MWD staff and will be brought to this Board during the month of August after water quality results and other information has been analyzed.

¹ Stanford Woods Institute for the Environment – Water in the West (2013, October 10). *San Juan Capistrano-Prop 218*. Retrieved from <http://waterinthewest.stanford.edu/resources/forum/san-juan-capistrano-prop-218>

While these opportunities are being vetted, it is important to recognize that the constraints associated with a recycled water supply for Montecito would most likely result in a very small offset of the current potable water demands and shouldn't be considered a significant drought relief measure.

ADDENDUM

DATE: AUGUST 19, 2014

TO: BOARD OF DIRECTORS

FROM: ENGINEERING CONSULTANT

SUBJECT: POTENTIAL RECYCLED WATER OPPORTUNITIES – WASTE WATER QUALITY REPORT

DISCUSSION:

As this Board is aware, staff from the Montecito Water District (MWD) and Montecito Sanitary District (MSD) have been working together to explore various options for providing recycled water to customers within the MWD service boundary. Staff from both Districts generated a detailed report which was presented to the Board on July 15, 2014 and provided an overview of recycled water options and the various requirements associated with this water supply.

At this time, staff is providing the Board with additional information as it pertains to the existing wastewater quality at the Montecito Sanitary District.

TYPES OF RECYCLED WATER

As previously reported, wastewater must be treated to certain levels depending on the intended use of the recycled water. In general, higher levels of treatment are required when the intended use of recycled water is in areas where the public has greater exposure or unrestricted access.

Per Title 22 of the California Code of Regulations there are four types of recycled water, each distinguished by the level of treatment employed. To meet the requirements of Title 22, the wastewater must go through secondary treatment which consists of oxidizing the wastewater to stabilize the organic matter. Advanced wastewater treatment beyond secondary is referred to as tertiary treatment and involves coagulation and media filtration or membrane filtration to meet turbidity criteria.

The MSD wastewater treatment plant currently produces disinfected secondary effluent. Based on total coliform samples collected by MSD from August 2013 to July 2014, the MSD effluent meets the Title 22 requirements for Disinfected Secondary 23 Recycled Water.

Wastewater treated to this level has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed a most probable number (MPN) of 23 per 100 milliliters utilizing the bacteriological results of the last seven days and does not exceed an MPN of 240 per 100 milliliters in more than one sample in any 30 day period.

However, it is important to note that while these sample results indicate that the total coliform is within the parameters for Disinfected Secondary 23 Recycled Water, the State must approve the sample results and may require additional sampling to verify and ensure the effluent consistently meets these requirements.

Per Title 22, recycled water meeting the requirements for Disinfected Secondary 23 Recycled Water can be used for surface irrigation of the following:

- Cemeteries,
- Freeway landscaping,
- Restricted access golf courses,
- Ornamental nursery stock and sod farms where access by the general public is not restricted,
- Pasture for animals producing milk for human consumption,
- Any nonedible vegetation where access is controlled so that the irrigated area cannot be used as if it were a part of a park, playground or school yard.

RECYCLED WATER QUALITY AND IRRIGATION SUITABILITY

While Title 22 defines recycled water requirements as they pertain to public health and safety, there are no requirements related to the suitability of recycled water for either crop or general landscape irrigation uses.

It is important to recognize that recycled water may contain concentrations of specific constituents that are not desirable when used as a source for irrigation of either crops or landscape. In instances where the quality of the recycled water is not desirable, it is often necessary to either blend the recycled water with potable water or employ additional treatment processes to improve the quality.

There are many constituents present in recycled water; however, the most important ones to evaluate when considering irrigation suitability are salinity (E.C.), chloride, sodium, TDS and nitrate.

On July 3, 2014 a water quality sample was collected from MSD's final effluent by a qualified independent laboratory. The sample was analyzed to determine both crop (avocado and citrus) and general landscape irrigation suitability. The results of these analyses are summarized in Table 1 below. The water quality results in their entirety have been attached for reference.

Table 1 – Irrigation Suitability Analysis Summary

Test Description	Result	Suitability				
		Good	Possible Problem	Moderate Problem	Increasing Problem	Severe Problem
Sodium	515 mg/L					
Chloride	660 mg/L					
Nitrate*	105 mg/L					
TDS	1,940 mg/L					
E.C.	3.55 dS/m					
SAR	9.3					

* Nitrate suitability applies to general landscape only. Nitrate concentration “Good” for crop suitability.

As Table 1 indicates, several of the water quality parameters indicate that a “severe problem” exists with the MSD effluent as it pertains to the suitability of irrigating avocado, citrus and general landscaping.

Excessive amounts of sodium, chloride or salinity (E.C.) can be toxic to plants and may cause undesirable effects such as a decrease in crop production, decrease in plant growth or cause an undesirable appearance of the plant.

Of specific concern is the concentration of chloride and salinity (E.C.) in MSD’s effluent. Per industry publications, an E.C. value above 3.0 dS/m is likely to cause salinity problems and should be avoided or diluted with less saline water prior to being used for irrigation. MSD’s effluent has an E.C. above this value at 3.55 dS/m.

Similarly, chloride concentrations exceeding 355 mg/L are considered toxic when absorbed by roots, and concentrations above 100 mg/L can damage sensitive ornamental plants if applied to the foliage. The MSD effluent has a chloride concentration that is nearly double (660 mg/L) this recommended concentration.

Finally, the concentration of total dissolved solids (TDS) is also above the recommended threshold (1,200 mg/L), which can impact the growth and quality of grass and plants. The MSD effluent has a TDS concentration of 1,940 mg/L.

While the concentrations of these constituents exceed levels recommended for the surface irrigation of crops and landscaping, it is important to note that MSD is an ocean discharger and is in full compliance with its NPDES discharge permit.

In conclusion, the MSD effluent has elevated levels of several constituents that directly impact plant growth and appearance, and will require advanced tertiary treatment or blending with potable water to mitigate these impacts.

CONCLUSION

Based on the results of recent water quality testing, the existing wastewater is not suitable for surface irrigation without advanced tertiary treatment such as microfiltration/reverse osmosis process (MF/RO).

While detailed capital costs have not been developed as a part of this report, the 2013 South Coast Recycled Water Development Plan prepared as a part of the Santa Barbara County Integrated Regional Water Management (IRWM) planning process included a rough order of magnitude cost estimate for treatment upgrades. Per the 2013 report, it was estimated that capital costs associated with upgrading the wastewater plant to produce recycled water meeting Title 22 tertiary requirements could be as high as \$7M depending on the treatment process employed and the amount of recycled water produced.

Along with the long term upgrades required at the MSD wastewater facility, a significant amount of new infrastructure consisting of distribution pipelines, storage reservoirs and pumping stations would be required to distribute recycled water throughout the MWD service area. While the 2013 South Coast Recycled Water Development Plan included only conceptual level planning and rough order of magnitude cost estimates for the distribution system improvements, it was estimated that the capital costs for these improvements could be up to \$11M depending on the extent of the recycled water distribution system.

There are currently no plans to upgrade or expand the MSD wastewater treatment facility. However, when the treatment plant is in need of reconstruction and upgrades, it would be appropriate to construct a tertiary treatment process as part of the new facility.